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611.

OUTLINES

OF

HUMAN PATHOLOGY.

2

BY

HERBERT MAYO, F.R.S. &c.

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Page 2,	line 35,	*for* little or no,	*insert* generally little.
3	16	gelatinous	more gelatinous.
6	15, *after*	broken	above the pronator teres.
13	12, *for*	[*d.* 5.]	[*d.* 6.]
37	34	an inch	half an inch.
40	6	not, nor	seldom, or.
76	11	fifth	fourth.
81	18	1831	1835.
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CORRIGENDA.

Page 384, *for* crural, *read* inguinal.

Cases from Dr. Abercrombie, quoted without brackets or acknowledgment, in pages 317, 404, 405.

M. Simon's experiments quoted instead of those of MM. Prevost and Dumas, page 406.

N.B.—*The numerical references in this volume are to specimens in the Museum of King's College; the small letters to preparations; the capitals to wax models.*

INTRODUCTION.

OF DEATH; AND OF THE ELEMENTS OF PATHOLOGICAL STUDY.

There is a life, which is simply vegetative. This is displayed in plants, and in molæ or imperfect conceptions of animals. It consists in nutrition; that is to say, in the performance of certain actions through which the individual imbibes, and assimilates, and distributes through its frame, foreign matter, with the double end of preserving itself against the destroying influence of external agents, and of producing other similar beings to perpetuate its species. The death of vegetative life is the cessation of nutrition: a time arrives, when foreign matter is no longer imbibed and assimilated, and when the organized body yields to decay.

Animal life is vegetative life, and something more. An animal, like a plant, grows by nutrition; but besides the organs employed in assimilation and secretion, it has others [formed in it by the same principles of growth as the assimilating organs] in which, through a mysterious union, sensation and volition, instinct and reason, temporarily reside. Of these organs in the higher animals, and in man, the brain is the essential one: the extinction of the function of the brain is their DEATH;—whether we regard Man, whose death is the separation of the body and of an immortal soul, — or animals, whose death is the suppression of a narrower consciousness.

When we examine the varieties of cerebral lesion or impairment, that are sufficient to put an end to consciousness, they are found to be reducible to eight distinct heads:—mechanical or chemical injury — mental shocks — direct action of certain poisons on the brain — deficient momentum in the circulation of arterial blood in the brain — circulation of black blood in the brain — collapse following over-excitement—deficient nutrition—sympathy with lesions of other parts.

I. *Mechanical or chemical injury.*

a. Concussion of the brain, if sufficiently violent, is instantaneously fatal, through direct extinction of cerebral power.

b. Partial laceration of the upper part of the medulla oblongata is capable of destroying life at the instant. This is proved by the following experiment.

Cold-blooded animals have a wonderful tenacity of life, and retain sensation and volition for a considerable period after the heart and lungs have been removed. If in a frog so mutilated, and retaining sensation and volition, the upper part of the medulla oblongata is injured by passing a needle through it, consciousness is directly extinguished.

The corresponding part in man, which is about half a square inch in volume, is the immediate "link that binds us to life." A wound in which it is divided, an apoplectic effusion by which it is lacerated, are at the moment fatal. So strong is the influence of this little segment of the enkephalon, that when cold-blooded animals are decapitated,—as it is contrived that the separation of the head is made higher or lower,—it is in the first case the head, in the second the body, which is killed by the division; the other mutilated portion continuing for a period to exhibit sensation and volition. The half which has the medulla oblongata left in it remains alive, the other half is dead. If the section divides the cervical vertebræ, the head continues alive, the body is dead. If the section is carried through the occiput, so as to leave the medulla oblongata in connection with the trunk, the trunk lives, the severed head is dead. When in a perfect animal this little part is destroyed, one convulsion takes place, and the limbs are then for ever relaxed in death.

c. Pressure upon the brain carried to a certain extent, and applied so as to tell upon the medulla oblongata, extinguishes life.

d. The influence of chemical lesion in irretrievably paralyzing the brain is shown in the effect of lightning passing through the head.

II. *Mental shocks.* Great and sudden terror has been known instantaneously and permanently to extinguish consciousness. And although this case is probably always complicated with syncope, no reasonable doubt can be entertained that the mortal lesion here, as in death by lightning, is cerebral palsy.

III. Certain poisons, of which the woorara is an instance, directly depress the powers of the brain to a degree which is incompatible with the persistence of consciousness. The poison mixed with the blood, and circulating in the brain, disturbs its organic elements. That disturbance, however, may be so slight in degree, that, although sufficient entirely to suppress consciousness for the time, its influence will wear off, and consciousness return, *if, in the mean time, the ordinary nutritive processes are maintained.* This can be accomplished by means of artificial respiration. If in a horse, in which animation has been suspended by a *measured quantity* of woorara, the lungs are kept in play by being alternately inflated and allowed to collapse, the heart continues to receive a supply of red blood, and to circulate it through the brain; which after a period recovers itself, and consciousness returns. If artificial respiration is not employed in this case, as the instinct of breathing is suspended, recovery soon becomes impossible in consequence of black blood circulating in the brain. When a *strong dose* of woorara has been used, all attempts at restoring the animal are vain. The circulation of red blood may be maintained till the heart ceases to act; but no glimpse of consciousness reappears. The poison has irretrievably palsied the brain.

IV. *Deficiency of momentum in the flow of arterial blood* upon the brain will suspend its functions. The state of unconsciousness so produced is termed *syncope*. It may result either from want of blood in the system through hemorrhage, or from feebleness of the heart's action owing to some mental impression, or from both causes united. The time that syncope may continue, without the cerebral functions being irretrievably extinguished, is not known.

V. *The circulation of venous blood* in the brain produces another form of unconsciousness, which is improperly termed *asphyxia*. This state occurs in death by drowning, hanging, and every other form of suffocation. There is reason to believe that when black blood has circulated for five minutes in the brain, consciousness is irrecoverable. The poisonous or paralyzing influence of the black blood is shown by the fact, that, if a person fall into the water in a fainting fit, and the syncope continues, he may remain a *considerable period* immersed, and animation can afterwards be restored. There has been no breathing: the blood has not been oxygenated; but *it has not circulated.*

VI. The powers of the brain may flag and cease through depression following over-excitement. An animal that is made to breathe pure oxygen, after a period of hurried breathing and excited circulation, falls into stupor, and dies. It is thus that in the first stage of acute inflammation of the brain, consciousness and life are liable to be extinguished. Death from exposure to intense heat, as far as it depends upon direct *cerebral* exhaustion, is referable to this head.

VII. *Deficient nutrition*. In death from inanition, it is presumable that the weakening of the brain in some cases causes, and in all contributes to death. In death from age, whether natural or *premature*, the failure of the brain, and cessation of consciousness, are sometimes owing to this cause.

INTRODUCTION.

OF DEATH; AND OF THE ELEMENTS OF PATHOLOGICAL STUDY.

There is a life, which is simply vegetative. This is displayed in plants, and in molæ or imperfect conceptions of animals. It consists in nutrition; that is to say, in the performance of certain actions through which the individual imbibes, and assimilates, and distributes through its frame, foreign matter, with the double end of preserving itself against the destroying influence of external agents, and of producing other similar beings to perpetuate its species. The death of vegetative life is the cessation of nutrition: a time arrives, when foreign matter is no longer imbibed and assimilated, and when the organized body yields to decay.

Animal life is vegetative life, and something more. An animal, like a plant, grows by nutrition; but besides the organs employed in assimilation and secretion, it has others [formed in it by the same principles of growth as the assimilating organs] in which, through a mysterious union, sensation and volition, instinct and reason, temporarily reside. Of these organs in the higher animals, and in man, the brain is the essential one: the extinction of the function of the brain is

OUTLINES

OF

PATHOLOGY.

CHAPTER I.

THE BONES.

The pathological phenomena, which are displayed in the bones, may be arranged under the following heads: Reparation, Hypertrophy, Atrophy, Inflammation, Abscess, Necrosis, Caries, Malignant Growths, Hydatids.

SECTION I.

Reparation of Bone.

The leading practical distinction in fractures is into simple and compound. A fracture is simple, when the injury is confined to the bone; compound, when the injury involves other parts, through the laceration, or sloughing, or ulceration of which, the broken bone is exposed. The restorative process differs in some important respects in these two cases. Nevertheless, simple and compound fractures are originally convertible. After a simple fracture it may happen, that through one or other of the causes specified, the bone may become exposed. After a compound frac rent tone of vital endowments belongs, so that the same influences produce not exactly the same effects on any two; but there is a natural succession of changes under similar circumstances peculiar to each, and modified even in the same individual by the very hour at which they are commenced.

The librations of health are the province of physiology. To Pathology belongs the study of those wider excursions from the normal type, which constitute disease — the investigation of those disorders of function and changes of structure, which, although some of them tend towards restoration, yet may all be viewed as exhausting in different degrees the resources of life, and many as directly and inevitably leading to disorganization and death.

Or the subjects of pathological inquiry may be thus summarily stated: —

I. The elements of alteration of the bodily structures or products, including—the processes tending or not to reparation which follow mechanical or chemical lesion — the laws of hypertrophy or excess of growth, of atrophy or wasting — the laws of inflammation and its consequences, ulceration, effusion, suppuration, gangrene — the laws of irritation and fever—the nature of tubercle—the nature of malignant diseases, comprehending carcinoma, melanoma, medullary and gelatiniform sarcoma — the laws of the disturbances of functional secretion.

II. The modifications which these pathological elements display in affections of different tissues and organs—in the bones—in the joints—in the muscles and sinews—in the brain and nerves—in the digestive organs—in the circulating and respiratory systems, and the rest.

III. The relation of different forms of disease to each other; as, for example, the connection of gout and *stone* — of sugar in the urine, or of fat in the liver, with tubercle in the lungs.

IV. The reciprocal influence of different organs, whether mechanical—as the production of ascites and anasarca by disease of the mitral valves of the heart — or chemical, as the suppression of lithic acid sand by alkalies which neutralize the acid of the stomach — or vital, as the subsidence of the increased action of the heart, of the hurried breathing, of the cerebral excitement of continued fever upon the temperature of the surface being lowered by cold affusion.

V. The influence of sex and age, in modifying the progress and character of disease.

VI. The influence of natural and acquired temperament, and of diathesis.

In the present treatise, nothing so ambitious has been attempted as a complete discussion of the subjects above enumerated. The author's aim has been, to arrange in a perspicuous order, and to describe with as much brevity as is consistent with clearness, the morbid affections to which the different organs of the human body are subject. This, with some accidental omissions, and with the intentional omission of those subjects which are commonly made isolated studies, he trusts has been accomplished to an extent that may render the following pages not without their use. The analysis of the *elements of disease*, or of those common forms, which, as they are found even in channels within the callus *. The callus adheres to the surfaces of the bone above and below the fracture: it is (towards the close of the third period) covered with a separable membrane, which is continuous with the periosteum: there is no periosteum between the callus and the bone, but where the callus begins, the periosteum terminates in the membrane covering the latter. In the mean time, the lymph, by which the ends of the bones are glued together within the callus, undergoes little change. The work of restoration, at present, is all external. The quantity of callus formed bears a strict proportion to the quantity of injury. An oblique fracture, or a comminuted fracture, or a fracture which has been overlooked for two or three days, has a greater proportion of callus than a transverse fracture which has been set at once. [*c.* 35.]

4. The fourth period extends from the twentieth or twenty-fifth day to the thirtieth, fortieth, or sixtieth, according to the age and vigour of the patient. During this period, the provisional callus ossifies; and, at its expiration, the broken limb has already sufficient strength to admit of being used. As yet, however, no direct ossific union has taken place between the broken ends. If the ossified callus is at this time divided, the extremities of the bones are found to move easily upon each other, being united by a layer of soft vascular substance alone, which is continuous on the one hand with the external callus, and on the other with the thickened medullary membrane. [*c.* 1.]

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* There are four opinions as to the source of the provisional callus: that it is produced by the periosteum; that it is an exudation from the extremities of the broken bone, particularly from the medullary membrane; that it is derived by direct growth from the animal structure of the bone; that it originates in an infiltration of the textures adjacent to the bone. The first is the opinion of Duhamel, the second that of Haller, the third that of Baron Larrey, the fourth that of Dupuytren and of Mr John Bell. The account in the text is drawn up after M Sanson's account of Dupuytren's observations (Journal Universel des Sciences Medicales, tome xx), and some experiments of my own, published in the Medical and Physical Journal several years ago.

[illegible]

[illegible] together. [illegible] broken [illegible]

[illegible] broken limb [illegible]

[illegible] twisted. [illegible] tendency to [illegible] the lower. In fracture [illegible] part of the limb is [illegible] action of the muscles: while [illegible] downwards.

[illegible] must be re- [illegible] stretch the [illegible] A broken limb, when set, [illegible] one.

[illegible] broken limb of the right [illegible] rest. How soon, upon [illegible] should these means be applied? As [illegible] is concerned, the appli- [illegible] setting, is not requisite [illegible] grounds, it is expe- [illegible]. The muscles, when no longer [illegible] and shorten: and it is often [illegible] of four or five days, to [illegible] length which it may have lost [illegible]. It is true, indeed, that a [illegible] so swollen, that splints cannot be [illegible] the swelling serves the same purpose, [illegible] the stretch. It deserves likewise [illegible] fractures unattended with swelling occa- [illegible] when nothing is done but laying the broken bone in an easy position. [illegible] [illegible] [illegible] [illegible] [illegible] which this rule is to be followed, is when [illegible] contraction of the muscles supervenes [illegible] [illegible] [illegible].

d. In the progress of the reparative changes of bone is there any definite period, up to which a [illegible] of an ill-set fracture may be effected? Till after the [illegible] or sixtieth day, the definitive callus is not [illegible] and the provisional callus either is not [illegible] or when [illegible] is of so light and porous a structure as to [illegible] sufficiently to allow of considerable alteration in the [illegible]ment of the parts of the bone.

e. In connexion with these views [illegible] [illegible] [illegible] what rules, or what cautions, does a knowledge of [illegible] suggest, in reference to the detection of fractures? The limb shortened and powerless, with [illegible] and [illegible] at the fractured part, are signs in general sufficiently characteristic. But fractures near the extremities of bones—*e. g.* of the lower ends of the radius and ulna, and of the inner extremity of the clavicle, do not [illegible] [illegible] these features. Clean transverse fractures, again, of any part of any bone—of the middle of the tibia for instance—or separation of the epiphyses, are often not attended with shortening, or total want of power, or evident [illegible]. Fractures again, in young persons, may be partial, the bone appearing to be bent only, the fibres on the [illegible] side having escaped. In straightening such partial fractures, the rupture of the bone is generally rendered complete. Finally, morbid anatomy teaches, that there is no fracture which can be made by hammering a skeleton, no unusual and accidental separation of parts of bones which is not sometimes produced by injuries of the living frame; and that there is no complication of one fracture with another fracture, or with dislocation, that does not, in the chapter of chances, occasionally occur, baffling those who do not combine with extensive knowledge untiring circumspection.

II. The instances, in which union is effected through a process originating in the bone itself, are fractures of the cranium, and of the neck of the thigh bone within the capsular ligament. In the first of these cases [illegible] [illegible] callus is formed: in the second, the provisional callus has no means of reaching the fracture.

1. It is difficult to explain why a provisional callus does not form about fractures of the cranial bones. The physical cause of this negative phenomenon is not known. The final cause, however, is evident. If a hard swelling, such as a provisional callus, were stretched as a ridge along the inner aspect of a cranial fracture, it would encroach upon the cranial cavity; and hemiplegia, epilepsy, or some other form of cerebral disorder would attend the cure of every fracture of the skull. No callus, therefore, is formed. But the fracture after a time shows a disposition to unite through forces inherent in the bone itself. Their operation manifests itself in the following steps. The edges of the broken bone slowly undergo a change: they lose their sharpness, and become externally rounded; while within, by a gradual extension of growth, they steal across the interval, and finally unite. In a fissure of the skull examined some months after the injury, the only change apparent is the rounding of the edges externally. After a year or two, the fissure is united at its internal or cerebral aspect. After the lapse of many years, the narrowest part of the fissure is entirely filled up. In persons who have lived ten, twenty, fifty years after loss of portions of the cranium, the slow restoration of the bone appears to have been progressive for the whole period. In fifty years a trephine hole is nearly closed by the shelving growth of bone from the margin towards the centre. [*c.* 27. *c.* 28.]

2. There is reason to believe, that fracture of the neck of the thigh bone within the capsular membrane, when it unites by bone, unites by the same steps with a cranial fracture. Reparation however by bone, in such a fracture, is rare. In general, either no union is found to have taken place, or the union is by soft, white, fibrous substance. In examining the body of an old man, who had died of apoplexy, I observed that one leg was shorter than the other, and that the hip joint was deformed. Upon opening the joint, it was found that there had been a fracture at some former period of the neck of the femur within the capsule. The fracture had not united; but the separated head of the bone was firmly attached by ligament-like

with which the joint is kept at rest, direct union by soft substance takes place between the separated portions. Nothing, in truth, is then wanted for the restoration of the part, but time. The connecting soft substance will certainly, in time, ossify from the adjoining bones; not rapidly, as when the process stretches inwards from a provisional callus, but slowly, as when it spreads across a cranial fissure.

The reason why so few specimens are met with of united fracture within the capsule is, that this accident commonly happens to aged people: and aged people want both constitutional power and time for that slow and difficult process of restoration, which is independent of a provisional callus.

The explanation which I offer of the rareness of bony union in these cases, rests upon theoretical reasoning. The following additional facts may therefore be considered of importance, in establishing its correctness.

Fractures which on one side have fallen within the capsular membrane, and on the other have extended beyond it, are occasionally met with in progress of union. In two such specimens, which I have examined, union by soft substance alone has taken place on the side of the fracture within the capsule, while the union is already bony on the other side, where it had the assistance of a provisional callus. In those winding fractures, again, which dip wedge-like into the thick upper part of the femur, and the circumference of which is exterior to the capsule, the external union is often found to be perfect, while a line of soft union alone extends through the interior part. Yet the only difference between the united exterior and the as yet ununited interior, is in the close contiguity of the former to a provisional callus, to the presence or exclusion of which I attribute the other differences under discussion.

r table of the frontal, parietal, and occipital bones, was d hypertrophied: all the arterial grooves were of unal depth. The bones were not particularly vascular.

A sort of hypertrophy of bone is the extension of ossition into the ligaments and muscles. In a preparation the King's College museum, the femur is fixed immova- in the acetabulum by ossification of the anterior part of the sular ligament, and of part of the iliacus internus. Mr. Langstaff, in his rich pathological collection, has a utiful specimen of ossification, which appears to have read from the femur, and involves the vastus externus structure of which is converted into bone, but preserves ternally its fibrous character.

The alliance between the ossification of ligament, muscle don, and exostosis, or, at all events, the origin of the mer from the bones, is well exemplified in the remarkle skeleton called Mr. Jeffs, in the Hunterian Museum, ich is thus described in the printed catalogue.

"It is the skeleton of a man thirty-nine years of age and remarkable for the production of osseous growths in ny parts, of various dimensions and extent: some forming exostoses merely, whilst others pass from one part of the eleton to another, and have thus produced anchylosis or mobility of most of the members. The exostoses may be served in the os frontis, mastoid process, and zygoma, d in other parts of the skeleton where muscles are atched, as near the angle of the jaw, where the masseter is serted: at the extremities of the spines of the vertebræ; the coronoid processes of the ulnæ; in the femur at the rt where the glutæus maximus is implanted.

"The second and more extensive kind of ossifications ave in general followed the course of the larger muscles, nd may be seen, on the right side, in the situation of the eltoid, joining the clavicle and acromion of the scapula to he humerus, in the situation of the supra-spinatus; and assing from the inferior angle of the scapula to the humerus, in the situation of the teres major and latissimus lorsi. On the back, more extensive ossifications of the musles appear, which affix the scapula on both sides to the

[illegible]

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with deficiency of bone earth, and with more or less alteration of the gelatin of bone and of the medullary membrane.

a. As use strengthens parts, disuse weakens them. In a limb long unused from disease, the bones, together with the soft parts, waste, or are atrophied. A young woman had her leg amputated for disease of the tibia, which had existed eleven years. At its commencement, it had attacked the head of the bone, and implicated the knee joint, which became anchylosed. The disease then left the knee, and established itself in the middle and lower part of the tibia. The patient could not use the limb; and where not swollen by disease, it wasted. On examining the limb, the upper part was found to be atrophied. The head of the tibia is a thin shell of bone; and instead of its proper close cancellous structure, a few fine threads only of bone are drawn across it. Among these, the marrow lay in large masses, semifluid, supported by the medullary membrane alone. [*d*. 29.]

b. In childhood, and particularly among female children, the round bones are liable to a form of atrophy which corrects itself with advancing years. The weakness involves the ligamentous structures. It shows itself at the ancles, at the knees, but principally in the back: the spine becomes curved from weakness, inclining to one side at the loins, but being simultaneously bent at the upper part in the opposite direction, so that the trunk may preserve the perpendicular. This complaint is atrophy from arrest or retardation of structural growth. The weight and size of the child increases faster than the hardness and strength of its bones and ligaments. Sometimes the spine is twisted, sometimes incurvated forward as well as laterally.

c. In old age, the bones become weaker and more brittle. The cortex is thinner; and in it, and in the cancelli, the due quantity of bone earth is wanting. This is the cause of the frequency of fracture of the neck of the thigh bone in elderly persons. The mechanical disadvantage arising out of the obliquity of that part now becomes apparent; it breaks from trifling accidents. Through senile atrophy, the neck of the femur, when not broken, often becomes depressed and shortened.

[illegible]

[illegible]

[illegible]

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[illegible]

[illegible]

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thigh bone broke, and, shortly
Mr. Hamilton, with great liberality
King's College museum a preparation
rom this body; and the following were the
ral *post mortem* appearances.
ere healthy; the heart rather large and
nal viscera and mesenteric glands healthy
derable calcareous deposit in the [illegible] and
In the cranium, when the dura mater was

although reflected over the cancelli, has little else in common with them. Accordingly, each of these membranes is liable to be attacked with inflammation, independently of the bone: they are not, however, the less liable to be drawn into inflammation through extension of action from the proper osseous tissue.

Inflammation of the periosteum is of frequent occurrence. Inflammation of the medullary membrane is, on the contrary, extremely rare. Both are liable to present themselves under an acute character. Acute periostitis often follows exposure to cold. It is attended with swelling, that is, with thickening of the periosteum, with pain, and increased sensibility. Under proper treatment, it quickly terminates in resolution. Acute inflammation of the medullary membrane I have seen demonstrated in one specimen alone, which Mr. Stanley showed to me, from a case in which this affection had followed amputation.

Subacute or chronic inflammation of the periosteum is often produced by mechanical injury.

Periostitis is attended, first with tumefaction or thickening of the membrane, which becomes painful and acutely sensible to pressure; secondly, with a growth of osseous tissue between the external surface of the bone and the membrane. The newly-formed bone is porous, and has but slight adhesion to the old [*d.* 20.]: in time, it becomes compact and hard, and adheres inseparably. [*d.* 21.] Part of the pain of periostitis arises from the tension of the membrane, and may therefore be relieved by dividing the membrane to the bone.

Simple inflammation of the substance of a cylindrical bone is characterised by the slowness of its progress. It is attended with enlargement of the bone affected, with aching, and a sense of weight.

The surface of a cylindrical bone enlarged through inflammation, is uneven, often presenting the appearance of flat and irregularly-plaited chords [*d.* 22.]; in other instances it is highly porous [*d.* 23.], and never perhaps as uniformly dense and compact as healthy bone. The enlargement is commonly partial, and limited often to one aspect of the bone. The different appearances found on making sections of inflamed cylindrical bones are the following: —

1. A growth of porous bone superimposed upon the cortex. [*d.* 20.]

2. A growth of compact bone in the same situation. [*d.* 21.]

3. An expansion of the cortex through its conversion into porous bone. [*d.* 24.]

4. An expansion of the cortex, through its apparent separation into an outer and inner layer, with porous or cancellous structure between [*d.* 25.]; or the expansion consists of an outer part compact, an inner part porous bone. [*d.* 26.]

5. Expansion of the cortex, with compactness of texture throughout. [*d.* 23.]

6. The medullary cavity more or less diminished, either by the encroachment of the cortex inwards, or through the solidification of the cancellous structure. [*d.* 27.]

Several of these appearances are often met with together. It is evident what combinations are possible, upon considering how each appearance is produced. The two first have been already accounted for, as consequences of periostitis. The rationale of the production of the four last may be understood by reference to the healthy structure of bone. In the fabric of a healthy cylindrical bone, there seem to be two types of structure: there is, however, in reality but one. The cortical part is not essentially different from the medullary. When a dry cylindrical bone has been broken transversely, on examining the surface of fracture with a magnifying glass, the transition from the lightest cancellous structure to the densest part of the cortex is seen to be perfectly gradual; the channels only are narrower, and the partitions stronger, where the grain appears to be closest. In the conversion, therefore, of compact bone into porous bone, all that necessarily takes place is the enlargement of existing cells: in the conversion of porous into compact bone, the partitions only require to be thickened. The varieties of enlargement, in the cases 3, 4, and 5, may thus be explained as successive stages of inflammation of the cortex.

Simple inflammation of bone is either produced in a single bone through some local impression, or occurs in several, as the result of a general disposition to inflammatory enlargement in the osseous system.

In the former case, it commonly follows a blow, or exposure to cold: it frequently begins with periostitis, and is seldom unattended with more or less necrosis. In the latter case, the affection seldom alters its original character, but remains from first to last a greater or less enlargement of bone, with more or less pain and weight of the limb affected; sometimes continuing a few weeks only, in other instances enduring for months and years, its course in general being steady, and without fluctuation; the attack coming on slowly, progressing slowly, receding slowly, and being unattended with affections of other organs.

A patient under thirty years of age, in whom the whole of the tibia, radius, and part of the os humeri, had been thus affected for many months, died in the Middlesex Hospital of erysipelas. The enlarged bones were perfectly dense throughout. [*d.* 27.]

Another patient, about the same age, had a considerable enlargement of one tibia, and a smaller swelling of the other: he happened to have broken the ulna some weeks before his admission. What had principally alarmed him was a sudden enlargement at the point where the broken bone had united: an elastic tumour had very suddenly appeared there about the size of a walnut. This patient had no sore throat or spots upon the skin; but was of a pale complexion, and out of health. He recovered in a few weeks, upon taking sarsaparilla with the oxymuriate of mercury, and living on a regulated diet, and in the equal temperature of an hospital ward.

A lad was in the Middlesex Hospital with painful enlargement of the lower end of the shaft of the femur. He recovered after some months, having derived evident benefit from caustic issues.

The tibia is more frequently inflamed than any other bone in the frame. Its dependent situation, which is opposed to the free return of the blood,—the extent of its subcutaneous surface, which renders it obnoxious to changes temperature,—its place and office in locomotion, which pose it to be frequently struck,—sufficiently account for is circumstance. After the tibia, the femur, humerus, dius, ulna, are most frequently attacked with simple flammation.

In a collection of bones which I purchased, there were veral of the cylindrical bones of one skeleton affected with e same form and stage of inflammation. The femur for stance, and the humerus, were enlarged; the whole shaft the first, the lower half of the second. The enlargement nsisted in the uniform expansion of the cortex into a orous or cancellous texture. In the same skeleton, the ones of the head and face had undergone a similar change. hey were considerably thickened, but remarkably porous d light; the compact tables of the cranial bones having panded, like the shell of some of the long bones. [*d.* 28.]

I have seen, in living persons, two instances of simple inammatory enlargement of the ribs: one occurred in a young dy, whose general health was not otherwise considerably paired: the result of the case is unknown to me. The ther had the following history. A young gentleman, through ard study and neglect of exercise, became dyspeptic, with ain in the head, and inability to collect his thoughts. After a time, three or four of his ribs on each side enlarged, and were painful. He gave up his studies, and went to the south of Europe, where he recovered. A year or two afterwards, he became a medical student in London. In a little time, his former indisposition returned; and he became again dyspeptic, with hypochondriasis, and painful swellings of the ribs. Upon going into the country, he recovered.

SECTION V.

Abscess in Bone.

When inflammatory enlargement of a single bone has long existed, suppuration may have taken place: there may have been wrought within it a cavity or cavities, lined with vascular membrane, and filled with pus. Abscess, if in a cylindrical bone, is commonly situated in one of the articular extremities.

The best account of this form of disease, is in a paper by Sir Benjamin Brodie, in the seventeenth volume of the Medico-Chirurgical Transactions. In this paper, three cases are described, in each of which the abscess occurred in the tibia; twice in the lower, once in the upper end. The ages of the patients were twenty-four, twenty-three, and thirty-four. In each the bone had been diseased for several years. In the first case, the limb was amputated; and the state of the bone, when examined afterwards, is thus described.

"The whole of the lower extremity of the tibia was harder and more compact than under ordinary circumstances, in consequence, as it appeared, of some deposit of bone in the cancellous structure; and in its centre, about one-third of an inch above the ankle, there was a cavity of the size of an ordinary walnut, filled with a dark-coloured pus. The bone immediately surrounding this cavity was distinguished from that in the neighbourhood, by its being of a whiter colour, and of a still harder texture; and the inner surface of the cavity presented an appearance of high vascularity. The ankle joint was free from disease."

In the second case, Sir Benjamin Brodie was led, by its similarity to the first, to suspect the real nature of the disease: he therefore trephined the bone at a spot two inches below the knee, to which the pain was immediately referred; and then, by means of a chisel, removed several other small portions of the bone at the bottom of the cavity made by the trephine. At this part of the operation, the patient suddenly experienced a sensation, which he afterwards described as similar to that which is produced by touching the cavity of a carious tooth, but much more severe; and immediately about two drachms of dark-coloured pus issued slowly from the part to which the chisel had been last applied. From this instant the peculiar pain belonging to the disease entirely ceased, and it has never returned; the patient being able to walk in three months salutary process is immediately commenced, which comprehends three objects. The first is, the separation of the dead part, or *sequestrum;* the second, the formation of a temporary shell of bone, to serve while the separation of the sequestrum is in progress; the third, the final restoration of the limb by the conversion of the temporary shell into perfect bone. The two first changes proceed simultaneously, and are the direct results of the same cause,—the irritation, namely, which the presence of the dead bone occasions.

The detachment of the sequestrum is effected partly by the absorption of the contiguous layer of living substance:—this is proved by the entireness of great part of the outer surface of a sequestrum [*d.* 35.]; partly by the absorption of the superficies of the dead bone: — this is presumed to happen, from the excavated and honeycombed surface which part of the sequestrum usually exhibits. [*d.* 34.] Mr. Wilson gives a satisfactory proof, that living tissues, in contact with a dead bone, can operate its partial absorption. Adverting to the practice of transplanting teeth, he observes, that the transplanted teeth used to adhere at first, but that they seldom remained in their new sockets more than three or four years; several such teeth, which Mr. Wilson examined, had lost their fangs by absorption [*].

The temporary new bone is formed around the dead. The dead bone is an irritant to the surrounding tissues, which, while they shrink from it, thicken and give origin to a sort of callus; that ossifying, as after fracture, forms an irregular shell of porous bone. In this shell, holes are either left, or wrought subsequently by absorption, which communicate, by means of sinuses, with the surface of the limb. Sinuses opening opposite to different points of an enlarged bone, afford strong presumptive evidence that the disease is necrosis. The sinuses and the holes in the shell of bone to which they lead, are the channels through which, in the common course of things, the sequestrum is finally to make its exit. [*d.* 33. *d.* 34. *d.* 35. &c.]

No sooner is the sequestrum removed, than a growth from the cancellous structure of the ends of the bone, and from the interior of the temporary shell, takes place, and fills the vacant cavity: at the same time the temporary shell of bone contracts in volume through a process of modelling absorption and deposition, and becomes smooth upon its surface, assuming at last the exact character of the bone which has been lost.

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[*] Wilson on the Bones.

In the ordinary course of a necrosis of the shaft of a cylindrical bone, it appears to be the cortex only which dies; at all events, the cortex alone comes away as sequestrum. The cancellous structure which it contained, whether dead or living, is absorbed before the sequestrum becomes detached. One may suppose that it does not die, for two reasons: first, the cancellous structure has more vascularity and vitality than the cortex, and might be expected to resist an influence which would destroy the latter; secondly, if the cancellous structure dies with the cortical part, where is the agent which removes it?

The following cases will serve to exemplify the ordinary features of the form of necrosis now under consideration.

A child between three and four years of age was seized with an inflammatory swelling of the leg, attended with considerable symptomatic fever. By the use of the ordinary remedies, the symptoms were mitigated; and in three weeks a deep-seated abscess was distinguishable, which was opened. The child recovered its health; but the enlargement of the leg continued, and a sinus remained where the abscess was punctured. At the expiration of a year, a piece of bone projected, which, on being drawn out, proved to be the cortex of the entire shaft of the fibula. [*d.* 33.]

Excepting in very young children, it is generally right to remove the sequestrum by an operation, several months perhaps before it would spontaneously come away. For this purpose, the best mode of proceeding is to make a hole in the new shell of bone, opposite to the middle of the sequestrum, to divide the latter, and then to extract each half. The pathological reasons for thus interfering with the natural course of reparation are the following. Protracted confinement of the patient to his bed or couch may produce sloughing of the integuments, or contraction of the limbs. The long confinement and continued discharge of matter may exhaust the constitution. The protracted continuance of the sequestrum in the new bone may give rise to caries, and even involve the neighbouring joint in disease.

T. L., ætat. fourteen, at Christmas 1833, without any previous injury, was seized with pain across the left instep; a swelling followed, which a fortnight afterwards was opened, when a considerable quantity of matter escaped. The swelling gradually extended up the leg. He remained now for several months in bed, suffering pain in the swollen limb, which was mitigated by the recumbent posture. He lay at first on the left side, a pillow being placed between the knees. The left hip, however, became sore from lying, when he was shifted to the right side. Towards the autumn of the same year, a surgeon made an incision upon the inner surface of the tibia, and trephined the bone: a sequestrum was thus exposed, but not removed. Lint was introduced into the hole made by the trephine, when the hole gradually spread by ulceration, so as finally to lay bare more than half of the shaft of the tibia; which remained, however, partially encased in new bone. Half a year afterwards, this patient came under my care, when, without having occasion to enlarge the opening, I removed a sequestrum eight inches in length. [*d.* 36.] The part rapidly closed. The calamitous part of this case is, that the opposite hip joint is anchylosed at a right angle with the body. This arose from the long confinement of the boy to one posture. It might have been prevented by proper care: the removal of the sequestrum at an earlier period, by shortening the duration of the illness, might alone have prevented it.

James Mills, ætat. eighteen, in April 1834, received a severe blow on the left tibia, through a chest falling against it. The bruised part was rubbed with vinegar. He walked about as usual during the next ten days. The leg then swelled and became painful, when leeches and fomentations were used. At the expiration of a week, a surgeon opened the swelling, and a considerable quantity of matter was discharged; afterwards other openings were made, and for

uneven surface of the bone, the inflammatory character of the disease, the length of time it has existed, and the numerous sinuses, which, as through an effort of nature, had opened in succession at different points of the [illegible]. I concluded that there must be within the bone either matter, or carious bone, or a sequestrum, which required to be let out or removed. Accordingly, an incision was made down to the bone, between the attachments of the biceps flexor cruris and vastus externus. The bone so exposed was irregular and hard, [illegible] was found leading into it. I proceeded, however, to apply the crown of a trephine over the middle of the exposed surface, when a circle of bone being removed, matter escaped, and the sequestrum was seen loose and detached within what was now identified as a strong shell of new bone. Another portion of the shell was therefore taken away by the trephine, to enlarge the aperture, and the sequestrum being divided, the separate portions were drawn out. The sequestrum proved to be the lower half of the shaft of the femur. It was hard, and, being loose in the shell of new bone, was not cut through without difficulty. A half trephine, the bone forceps, and a chisel and hammer, were used in dividing it. As the patient recovered, the knee gradually regained the power of flexion.

In this case, the necrosis had nearly implicated the lower articular end of the femur. In a case which Dr Mott mentioned to me as having been under his care, the head of the femur was so involved in a necrosis, as to render amputation at the hip joint necessary.

2. Another form of necrosis, is death of a bone to a greater or less depth, in consequence of injury of the surface, either mechanical or chemical.

Simple denudation of bone, when caused by a blow, if the patient be not aged, and have a good constitution, is not necessarily attended with necrosis. The tibia for instance, or os parietale, stripped of its periosteum by a graze, or the extremity of a bone sawn in amputation, or the broken surfaces exposed in a compound fracture, are capable of recovering themselves. The surfaces exposed in

these instances, instead of becoming dry and white, in four o
five days generally assume a light red tint, which graduall
deepens: a gelatinous exudation is then poured out, whic
coagulates upon the bone; and, receiving vessels from i
becomes a layer of organized and florid granulations, th
unite with those produced by the neighbouring soft te
tures, and close or fill up the wound. In the reparation o
a compound fracture, the substance of the bone having it
vascularity increased, appears to contribute more activel
to its own reparation than in a simple fracture. The whol
wound equally inflames, suppurates, granulates: it is i
these granulations that the provisional callus is formed.

If the violence done to the bone has been more considerable, or if the constitution, or the bone, be already diseased, partial necrosis takes place. The exposed surfac
remains dry and white, and after a few weeks is thrown o
as a thin plate or scale of bone. The bone is then said t
exfoliate. The thin plate of bone, or ring (which is it
shape if it follow an amputation), is called an *exfoliatio*
The surface from which an exfoliation has separated, is covered with granulations, the growth and ossification o
which replaces, in some degree, the substance lost.

A person about thirty years of age had the tibia graze
by a blow, and denuded of periosteum. The outer shell t
the depth of two lines, and the length of four inches, wa
necrosed. It separated in twelve weeks. [*d.* 37.]

In a compound fracture, it often happens that the mo
projecting point or edge of the broken bone is necrosed, an
exfoliates. Where there has been great violence, or pr
vious disease, a considerable extent of bone is often n
crosed. [*c.* 38.] Accidents of this kind again display t
difference in the restorative forces which different kin
of bone possess.

After amputation of the thigh or humerus, three, four,
five inches of necrosed bone occasionally come away.
person thirty-four years of age, who had lived intemperatel
was admitted into the Middlesex Hospital with compou
fracture of the leg: great swelling and inflammation fo
lowed; and on the sixth day, violent arterial hemorrhag

At this period I amputated the limb below the knee. The ends of the bones became extensively necrosed: the dead portion came away from the fibula in the twenty-third week, from the tibia in the twenty-fourth. [*d.* 40.] The portions were three inches long. They were genuine sequestra: round each a shell of new bone had formed.

If the integument and one aspect of the cortex of a cylindrical bone are killed by an injury, the cancellous structure granulates, and reproduces what has been lost.

Such is the force of reparation in the cylindrical bones, that whatever part be destroyed, the remaining part (or if there be none, the uninjured surrounding tissues) will reproduce bone to a wonderful extent.

3. The case is different with other bones.

A person sixty years of age fell from a cart, and grazing his head against the wheel, denuded the parietal bone. Towards the end of the eighth month, nearly the whole of that bone came away: the surface exposed was that of the granulating dura mater. No attempt at reparation by bone had taken place. [*d.* 39.]

Some approach to restoration, after the separation of a necrosis, has taken place, however, in the lower jaw, and is said to have partially occurred after necrosis of the scapula.

When the articular end of a cylindrical bone is necrosed, it excites disease of the joint, which precludes restoration. In a knee which I amputated, half of the outer condyle was necrosed, and in process of separating into the articular cavity. [*g.* 43.]

Necrosis of the bones of the wrist and tarsus, when it occurs, as it is sure to involve a joint, is equally destructive.

Necrosis of the os calcis, however, is an exception; the bone is of a size to allow of disease in it being partial. The necrosed part may exfoliate, and the bone recover. There would however, I conjecture, be little replacement of bone.

SECTION VII.

Caries.

What an ulcer is in the soft parts, caries is in bone. The prominent feature in each is loss of substance through absorption. Caries, however, is something more than mere absorption. When an aneurism of the aorta presses against the sternum or the vertebræ, the bones are gradually eaten through; they are partially absorbed; but they are not carious. When, however, to take a different instance, the face is attacked with lupus, and the ulcer spreading in breadth and depth reaches the bones, and they become excavated simultaneously with the soft parts in the enlarging ulcer, the osseous tissue is not only absorbed, but truly carious.

In caries, absorption is preceded by a change in the bone, which (with very few and doubtful exceptions) has a well-marked inflammatory character. The same condition persists during the progress of the absorption. There is further present an imperfect restorative action, which is shown in the more or less partial growth of unwholesome granulations from the ulcerated surface. Of these changes, the inflamed condition of the bone is the primary and most important; the absorption is secondary and accidental. The absorption may be prevented by subduing the inflammation; or may, having begun, be arrested, and the crop of unwholesome granulations converted into a healthy restorative growth, if the case is of such a nature as to allow of the suppression of the inflammatory or specific action.

There are four kinds of caries.

1. *Simple.* When in a person of sound constitution a state of unwholesome and protracted inflammation is set up in a bone, through some accidental local cause.

2. *Syphilitic.* When a disposition to a specific periosteal inflammation is produced by lues.

3. *Strumous.* When the scrofulous diathesis gives origin to caries.

4. *Malignant.* When the bones are absorbed in the spread of malignant ulcers originating in the soft parts.

1. *Simple Caries.*—It has been observed, that the bones of the leg are particularly disposed to inflammation. In persons of a constitution originally sound, hard labour, exposure to weather, bad and insufficient nourishment, co-operating with a dependent circulation, as they frequently produce ulcers of the leg, so do they occasionally produce caries of the bones of the leg. The tibia becomes inflamed, and then, instead of recovering or forming a circumscribed abscess, slowly enlarges: the cortex, already more spongy than natural, is next eaten through at one or more points: the cancellous structure within in the mean time is softened; and its cells are occupied with a thick brown fluid in place of marrow. The disease is often coupled with death of the bone, part of the carious bone undergoing necrosis. The external character of the limb is the same in necrosis and caries. The bone appears enlarged, and one or more sinuses open from it through the skin at points which are red, and soft, and sunken.

A child, six years of age, became my patient with an enlargement of the humerus immediately above the elbow: the joint was not implicated in the disease. The enlargement was from two to three inches in length, and situated principally to the outside of the axis of the bone: the bone had at this part three times its natural size; the skin covering it was inflamed; and towards the lower part there was an ulcerated opening, through which a probe might be passed into the cavity of the bone. The swelling had commenced two years before, and was attributed to a blow which the child had received. The local treatment adopted was the following: — Having divided the integuments to the bone on its outer edge, I made, with a small saw and chisel, an opening an inch long, and an inch wide, through the enlarged shell, and removed softened cancellous structure; leaving an exposed cavity of bone to granulate, fill up, and contract. This was a genuine case of caries following a blow; the bone inflaming, enlarging, the cortex partially ulcerated, the cancellous structure softened.

The practice of making a free opening into the diseased bone, with the removal of the softened part, brings to light, or is borrowed from, another principle in the pathology of caries. The diseased part often neither can recover itself, nor be absorbed; neither does it become necrosed. Left to itself, the caries would continue year after year, undermining the constitution of the patient, gradually invading the adjacent sound bone, and finally threatening with destruction the neighbouring joint.

It is often extremely difficult to tell whether an inflammatory enlargement of bone is abscess, or caries, or necrosis. The same treatment is fortunately applicable to each; the medullary cavity of the bone is to be freely opened.

To give instances of a different kind. — A patient was admitted under the care of Mr. Cartwright into the Middlesex Hospital, who had been shot in the groin: the ball had perforated the ilium, and lodged near the sacrum. The patient survived the injury many months. She died of extensive abscess of the pelvis, kept up by caries of the ilium.

A lad was kicked by a horse, and two ribs were fractured. Pleurisy followed, and empyema. By puncturing an intercostal space, I made an outlet for the matter, the discharge of which gradually diminished in quantity; but it was considerably more than a year before the wound finally healed. During the latter months, less than a drachm of matter came away daily: it proceeded from a carious state of the rib, which in time got well.

A man past the middle age had suffered many years with a large ulcer on the outside of the leg, which would sometimes partially heal, and then again spread to its former size. Over the fibula the ulcer was deeper than elsewhere. The appearance of the granulations was not the same at all parts of the ulcer. The portion of the surface, again, which at one time was healthy, would shortly after assume an unwholesome character, while the first became covered with florid granulations. Upon the greater part of the ulcer, the granulations were generally grey and flaccid, or greenish or yellow, and unorganized. A probe passed into the granulations covering the fibula, broke easily through a soft and gritty texture. The limb was amputated below the knee, in the Middlesex Hospital, in 1819. The tibia was inflamed and enlarged. The patient died. The appearance of the fibula, after maceration, was the following:—it was enlarged, and presented an irregular and porous surface. At the front, opposite to the middle of the ulcer, there was a long and deep excavation, which, in the dry specimen — to borrow an expression used by Mr. Syme — looks like the surface of loaf sugar that has been partially dissolved by dipping into hot water. [*d.* 62.]

A patient past the middle age, and bed-ridden, lay for a period on one side. The integuments covering the great trochanter mortified through the pressure, and a large ulcer followed the separation of the slough. At the middle of the ulcer the granulations sprang from the surface of the bone, which was partly necrosed, partly carious. The patient sank eventually. The appearance of the carious trochanter [*d.* 61.] corresponds to a considerable degree with that of the fibula above described.

A young man, from walking in a tight boot, had a blister form on the heel, which through neglect became an ulcer; and as he was compelled to walk a great distance daily, at the end of four months he was laid up with an inflammation which spread half way up the leg. The inflammation having subsided under the usual treatment, the ulcer was found to be the opening of a sinus that led to the posterior part of the os calcis. The patient upon this went to the sea side, and took iodine, when several minute portions of bone came away; and in two months the wound healed. He then returned to London, and resumed his former occupations, and for a time with impunity. But three months afterwards, in consequence of over-walking, he experienced a return of inflammation, extending from the heel over the leg, attended with fever, and severe pain. By rest and proper remedies, the inflammation again subsided; several minute portions of bone came away. At this time he was admitted a patient in the Middlesex Hospital, where he remained two months; by tions and viscid ash-coloured secretion. A probe pressed against the surface breaks through the soft and gritty texture of the caries.

Syphilitic caries is often attended with partial necrosis and exfoliation. [*d.* 69.] If left to pursue its ravages unchecked, the entire thickness of the bone attacked is gradually involved in it.

The coexistence of ulcerated fauces, and squamous eruption or other diseases of the skin, generally leaves no doubt as to the nature of the caries. Sometimes, however, the caries, such as I have described it, exists alone.

3. Strumous caries, in many cases, bears a close resemblance to syphilitic caries: in other instances it is difficult to draw the line between it and simple caries. In a third class of cases, certain peculiar and characteristic features are strongly marked.

A young lady, whom I have attended, has suffered from inflammation of the periosteum of the tibiæ in oval patches resembling nodes. Matter has slowly formed, and the bone has been exposed in a carious state; small exfoliations have then taken place, and the wounds have healed. Three swellings of this description have formed in succession. Her appearance gives evidence of the strumous diathesis.

A gentleman thirty-seven years of age, in whom the strumous habit is clearly marked, consulted me for caries of the palate. The alveoli of the upper jaw were likewise carious. He was liable to inflammation of the tonsils, attended with ulcers. The complaint, however, was not of syphilitic origin. The sister of this gentleman has had caries and partial necrosis of the turbinated bones.

A young man, twenty-five years of age, became my patient for caries of the head and face. A small exfoliation had taken place from the os malæ of the left side, and from the right superciliary ridge. The integuments of the right side of the forehead were swollen, puffy, and tender: there was discharge from the nose, and part of one turbinated bone was necrosed. No ground existed for supposing that the disease was of syphilitic origin.

There is not, that I am acquainted with, any essential which time the sinus had healed, and the pain, tumefaction, and redness had disappeared.

2. Syphilitic caries, as the name expresses, is an affection of the bones resulting from the poison of lues. It attacks indifferently the shafts of the cylindrical bones and the flat bones; but not the round bones, nor the articular extremities of the cylindrical bones. It begins with inflammation of the periosteum: it does not lead to much enlargement of bone. The bones commonly attacked are those which, lying near the surface, are obnoxious to cold: the tibia, for instance, the ulna, the clavicle, the cranial bones.

The swelling, by which syphilitic caries first manifests itself, is called a node. It is an inflammation either confined to the periosteum, or involving at most the cortex of the bone. The periosteum becomes thickened, and is exquisitely painful. If the integuments are divided down to the bone at this period, a thick, viscid, glairy matter, like honey, is often found in cells of the periosteum. A node is commonly oblong, from two to three or four inches in length. There are generally more than one: it is not unfrequent to see two upon one bone. [*d.* 65. 66. 67.] The surface of the bone now gradually enlarges, or is thrown up in patches of porous bone, either furrowed by longitudinal grooves, or spongy and sievelike, riddled with innumerable minute holes. This appearance is very common upon the tibia, ulna, clavicle [*d.* 65. 66.]; and I have seen it upon the inner table of the skull. The outer table of the skull, in venereal caries, generally has the appearance of being worm-eaten. [*d.* 68.]

Sometimes, but rarely, the scapulæ [*d.* 71.], and even the vertebræ, and the tarsal and carpal bones are attacked. [*d.* 72.]

While the caries of the bone is making progress, the integuments covering it inflame; matter forms below the skin, which after a time ulcerates. The skin, before breaking, has a livid colour; afterwards the skin surrounding the ulcer has the same hue. The edges of the

are commonly a little raised; its outline is irre-

nd its surface is covered with unhealthy granuladifference in the appearance of carious bones in this form of scrofula, and in the parallel cases dependent upon lues. Less pain, less periosteal inflammation, and a smaller extent of surface attacked, the absence of other symptoms, and the general physical appearance of the patient, afford a strong presumption of the scrofulous origin of the disease.

The bones of the face are peculiarly susceptible of scrofulous inflammation. The character of the complaint is often clearly established by the formation of extensive scrofulous abscesses upon the temple or upon the cheek, or at the angle of the jaw; and by the chronic enlargement of the lymphatic glands of the neck.

Of the bones of the head, the frontal and the temporal are the only ones which I have known involved in this form of strumous caries.

The sternum is often affected with strumous caries, characterised, as in the face, by the formation of extensive scrofulous abscesses. The seat of the suppuration is the anterior mediastinal cavity. The bone may require to be perforated with the trephine, to give vent to the matter. [*d.* 64.]

As in the diatheses of different persons every shade is met with, from delicacy of constitution to well-marked scrofula, so in affections of the bones every shade is found between simple caries and strumous caries. It is thus often difficult, between the two, to assign their true place to instances of caries. It is probable that many would be disposed to class some of the cases, which I have given to exemplify simple caries, as genuine strumous caries. Others, again, would include under the former head cases, which I shall describe as scrofulous. And this I suspect would be more philosophical. It is certain that fewer diseases are now considered scrofulous than formerly; and it can only arise from an imperfect state of knowledge, that forms of disease, so different as the three which remain to be noticed, should be grouped under one head.

The three cases to be described have, however, one point in common; *they are affections of bones, or parts of bones, which are immediately contiguous to joints.* Through this circumstance they at once acquire higher importance in a practical point of view, and are liable to have their nature obscured through the superadded symptoms of articular disease.

a. The ends of the cylindrical or round bones, which are covered with cartilage, are liable to become highly inflamed and softened for the depth of a line; the adjacent bone remaining perfectly healthy for many months, but being finally involved in the same action. The inflammation is so intense, that the bone is rendered for the depth specified of the brightest red, when the vessels are injected with size and vermilion. This state of the bone leads to absorption of the cartilage beginning on its osseous aspect, and is always accompanied with inflammation of the synovial membrane of the joint. The disease is probably most frequent in persons of the scrofulous diathesis.

I amputated the leg of a patient, twenty-five years of age, five months after a compound fracture of the tibia and fibula. The bones had shown a disposition to unite, but the general inflammatory swelling of the limb which supervened upon the accident, never subsided. Large collections of matter formed in the calf of the leg, and about the ankle. These were opened in succession, and the patient as many times rallied from the hectic fever and exhaustion which they produced. At last there formed above the knee joint an extensive abscess; which was opened; when a profuse discharge of matter took place, and afterwards of blood and matter alternately. It was now that the limb was amputated, but too late to save the patient. In the knee and ankle joints the cartilages were found partly absorbed, and what remained reduced to a thin shell. The articular aspect of the bone, which had become exposed, was highly inflamed. The narrowed and thin shells of cartilage which were left, were found to tear very readily from the bone: when torn off, the detached surfaces were found to be covered with bony particles, showing that the separation must have been effected by rupturing the inflamed surface of the bone. On further examination, the whole articular aspect of the condyles was found to be highly inflamed and softened, for the depth of one to two lines. The bone beyond was perfectly healthy. [*g.* 60.]

E. D., ætat. twenty, was admitted, in November 1833, into the Middlesex Hospital. Three years previously, she had been attacked with pain and swelling of the left elbow joint; which being treated with leeches and embrocations, went away in nine months. Shortly after her recovery, the left knee began to swell at the lower and fore part: the swelling was attended with pain, which, although constant, was severe at times only: she thought it rheumatism, and wore flannel round the joint. A year before her admission, the disorder in the knee became more serious: at times it confined her to her bed. The joint was hot, stiff, and painful. Several blisters were then applied in succession, and with some advantage. Leeches, fomentations, cold embrocations, bandaging, were tried, but were ineffectual. At the time of her admission, and for a month previously, she had been suffering the acutest pain, which the least pressure or motion aggravated to intensity. The knee was hardly swollen; it was a little bent. There was no impediment to further flexion but the pain it gave. The pain was severest beneath the patella: it extended through the thigh and leg. Having tried local bleeding, fomentation, a large issue, and opium, without any mitigation of her sufferings, I amputated the limb.

Upon opening the knee joint, the capsular synovial membrane was found to be inflamed and thickened, presenting a jelly-like granulated surface, which extended a little way over the cartilages of the condyles. The cartilages were but partially ulcerated towards the joint, and for a very small extent; but they tore readily from the bones. There were parts at which it was evident they had been already discontinuous, the surface of the cartilage being slightly excavated, and the opposite surface of the bone ulcerated, and extremely vascular. At other parts the cartilage, when being separated, tore away with it numerous granules of bone. This arose from the surface of the bone, for the depth of a line to two lines, having been highly inflamed, and softened in its texture. Beyond the ulcerated surface, the bone was perfectly healthy. [g. [illegible].]

The preceding form of disease is sometimes with, perhaps dependent upon, inflammation of the synovial membrane. It is accompanied generally with very acute pain.

b. The common appearances denoting scrofulous inflammation in bone, are, softness from deficiency of bone earth, increased vascularity of the medullary membrane, and, in the place of medulla, a thick reddish-brown fluid in the cancellous structure.

In the ankle bones of a child six years of age, examined immediately after amputation, I found the following appearances. The cartilage covering part of the posterior and upper surface of the astragalus had been absorbed; the cancellous structure below it was superficially ulcerated, and for a considerable depth was soft, as if rotten, its cells containing a thick brown fluid. The texture of the anterior part of the astragalus was healthy. When a horizontal section of the os calcis was made, about a third of its substance appeared healthy; the remaining and greater part had the brown and rotten appearance and consistence of the astragalus. The lower extremity of the tibia was in the same condition. [g. 67.]

Sir Benjamin Brodie thus describes the appearance of the elbow joint of a boy about ten years of age: —

"The cancellous structure of the articulating extremities of the os brachii, radius, and ulna, was so soft, that it might be crushed by a very slight degree of force when squeezed between the fingers. It was of a dark red colour, preternaturally vascular, and there was a reddish fluid, mixed with medulla, in the cancelli."

c. The appearance, which constitutes the most undoubted sign of strumous action, is the deposition in the cancelli of tuberculous matter — an unorganized substance, in colour yellow, and of the consistence of curd. The following instances are from Sir Benjamin Brodie's treatise on the Diseases of the Joints: —

William Miles, ætat. twenty-three, underwent amputation of the leg, for disease of the knee. "On examining the knee, the articulating extremities of the tibia and fibula were found so soft, that they were readily cut with a common knife: they contained much less earthy matter than is usual, and their cancelli were filled by a yellow cheesy substance."

Charles Miller, ætat. twenty, underwent amputation of the foot. "The extremities of the tibia and fibula, all the bones of the tarsus, and the extremities of the metatarsus, contained much less earthy matter than is usual. They were so soft, that they might be cut with a scalpel without the edge being turned. They were preternaturally red and vascular, and a yellow cheesy substance was deposited in the cancelli."

Strumous inflammation of the cancellous structure of bone, whether attended or not with curdy deposit, is generally characterized by its insidious march, the gradualness of the local swelling, and the absence of the pain which attends common inflammation. Even when the soft textures within the contiguous joint are in process of secondary ulceration, the suffering is often comparatively trivial.

There is no reason to doubt, that the disease, in its early stage, may be arrested by judicious remedies, of which the principal local means is the maintaining perfect quietude in the affected joint; and the general means, the observing those rules of diet, and medicine, and general habits, and place of residence, which tend to correct the strumous diathesis. Even when the disease has strongly established itself in a joint, there is still a remedy in amputating the limb; which is unquestionably to be resorted to, if the organization of the joint is completely destroyed, and the patient's health is rapidly failing, yet no vital organ seriously affected, and strength enough left to bear the operation. To decide upon the propriety of operating, in cases of less urgency, is an extremely difficult task. In some cases, where the constitutional tendency to scrofula is slight, the patient has been permanently restored to health by losing a scrofulous joint. In other cases, the local disease appears to be a vent to the specific action; and when that vent no longer exists, scrofula manifests itself in other t the angle of the jaw. When the ulcerative stage superenes, it involves the bone, which is kept excavated by proressive absorption to the level of the cancer.

There is a different disease, improperly called cancer, which produced by fretting any superficial sore upon the lip. The p becomes hard and thickened round the sore, which turns ther into a deep ulcer, or a wartlike fungus. This disease as not the malignancy of true cancer. When removed by cision, it does not commonly return. It is sometimes alwed to make considerable progress, before the patient will nsent to an operation; in which case great part of the lip ay have been destroyed, and the induration may have exnded to the gums and periosteum of the jaw. As, hower, the bone is not specifically involved in the disease, en then, at the expense of some mutilation, a cure may effected; all the soft parts attacked, including the thicked periosteum, being removed.

SECTION VIII.

Malignant Growths of Bone.

By malignant growths is meant a class of affections, hich consist in the enlargement of parts through the prouction of some new element, that has a tendency to indenite increase; the increase having no check but in the loughing or ulceration of the part; and the disposition to he new formation being so strong as to manifest itself in lifferent parts simultaneously or successively, and in the ame part a second time after temporary extirpation.

As the subject of malignant disease, bone displays the folowing remarkable features. Without the introduction of a ew element, a tumour of bone may in one sense be malignant: abnormal growth of bone from bone may be accomanied with a tendency to the deposit of phosphate of ime in other parts of the frame*. On the other hand, when new formations appear in bone with the local characters of malignant disease, they have not the same rootedness in the system, as when they originate in the soft parts; so that the removal of a bone attacked by malignant disease is not in general followed by a return of the complaint. For example, in one who has suffered amputation of the breast for medullary sarcoma, the disease is sure to recur; but when the leg is amputated for the same disease originating in the tibia, the chances are greatly in favour of the patient's permanent escape.

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* The Reader is referred to page 14 of the present work.

The common forms of malignant tumours of bones are six in number, which exist either separately or in combination. They are, malignant exostosis, osteo-sarcoma, medullary sarcoma, fibrous tumour, cystlike tumour, melanosis.

1. Of *malignant exostosis,* nothing is known to me beyond the facts mentioned in a former section, reference to which is given in the foot-note to the last page. This is probably a disease of very rare occurrence.

2. *Osteo-sarcoma* is well described by the term cartilaginous exostosis. It consists in a growth of substance, nearly resembling epiphytic cartilage in texture, originating either upon the surface or in the cancelli of bone. The form of the tumour is commonly more or less spherical: it may attain so great a volume as to be nearly a foot in diameter. [*d.* 78.]

When an osteo-sarcoma is small, the surface displayed by a section is tolerably uniform, or differs from the most transparent cartilage only in exhibiting minute oblong or irregular cavities. [*d.* 75.] When an osteo-sarcoma is larger, cavities of considerable size are found in it, which contain a reddish fluid. In parts the texture grates when cut, and contains phosphate of lime. The phosphate of lime is distributed so as to form a kind of skeleton of light bony plates disposed in a manner that looks like a crystallization. [*d.* 78.] The growth of such a tumour is commonly rapid. When it begins in the interior of bone, the disease is attended with pain: when it forms on the outer surface, there is commonly no pain at all. An osteo-sarcoma has to the touch the firmness and elasticity of cartilage. This disease is ordinarily met with in the bones of the extremities, and in the lower and upper jaw. The cranial bones and the vertebræ are less frequently, if ever, attacked by it. The disease does not, that I know of, invade any other texture than bone: it bears, however, some external resemblance to gelatiniform cancer of other parts. It has not much malignity; so that when all the bone involved in it, with part of the adjacent sound bone, is removed by amputation, the complaint seldom reappears either in the part, or in another bone. If the part is not amputated, the skin over the tumour sloughs or ulcerates, the tumour is exposed, and a discharge, sanious or ichorous, takes place from it, under which the patient gradually sinks.

The following case may serve to display the leading features of osteo-sarcoma.

David Palmer, at the age of eleven, when at play with other boys, received a kick upon the shin about the middle of the leg. The blow was hard enough to produce some swelling at the time; but no attention was paid to it. Gradually, however, the tibia enlarged at and round the part which was struck; and a year after the accident, the lad was admitted into the Middlesex Hospital with a very considerable swelling upon the bone. He was at that time suffering great pain, which he attributed to a blister that had been applied, and had left the skin covering the tumour raw. The sore surface was healed, when the pain went away; but the tumour continued slowly to enlarge. Mercury and iodine, which were tried, did not check its growth. The tumour was even, firm, and felt like cartilage, so as to leave no doubt upon my mind as to its character. However, to make its nature certain, I punctured it deeply with a lancet; when a brisk stream of arterial blood flowed from it, which stopped, however, readily on pressure. The sensation communicated by puncturing it, was the almost audible grating that is produced by cutting through cartilage in which ossification is beginning. I now proposed to amputate the leg, when the boy, through fear of the operation, left the hospital.

He then became the patient of a very intelligent surgeon

(Mr. Sutherland, of Hayes), who, as the boy would not submit to amputation, determined to remove the tumour by excision. The operation was performed on the second of June, 1832. The tumour measured in length five inches, and at its greatest breadth two. Its substance was cartilaginous: the base was bony. It was removed very completely. The tibia was left of its natural size, the exposed surface being to all appearance healthy. The soft parts were then brought together, and the wound closed. Every thing went on well for the first fortnight, and the wound appeared to have completely cicatrized; when a small opening, scarcely large enough to admit the end of a probe, was observed to have formed at one part of the cicatrix: this hole increased daily; and when it was big enough to admit the point of the little finger, a fungous tumour began to protrude through it, the growth of which could not be repressed. Other small holes now formed at different points of the cicatrix, through which growths of a similar appearance to the first protruded, and went on increasing, till the whole became one large fungus. The discharge was profuse; the boy's constitution became affected; the necessity of amputation was now strongly urged; and the operation was performed by Mr. Sutherland, on the twenty-eighth of July. The limb was removed above the knee.

The stump healed in the usual time, and the boy appeared to be well. But after some weeks, the cicatrix became tumid, and then broke into an ulcer over the bone. The boy returned to the Middlesex Hospital, and was again placed under my care. It was soon evident that the end of the femur was attacked by the same disease which had existed in the tibia. The end of the bone was considerably enlarged. Where the character of the enlargement was most distinct through the ulcerated cicatrix, the tumour was seen to be blueish and semi-transparent; and a probe forced into it, broke through gritty and cartilaginous texture. I recommended the only course which remained; namely, amputation at the hip joint: but the boy would not submit, and left the hospital. The tumour slowly increased, discharging daily a considerable quantity of ichorous matter. The boy died in March 1834.

The amputated tibia [*d.* 76.] and the extremity of the femur present similar appearances, being expanded into a porous and papery growth [*d.* 77.] of bone, which was the basis of the osteo-sarcoma. The practical deduction from the preceding case is, that, in osteo-sarcoma, it is a degree safer to amputate at a joint, than to risk, in a constitution disposed to this action, the exciting it in another bone by the saw.

3. *Medullary Sarcoma.* — Without entering upon the question of the minute structure and origin of this morbid growth, it is easy to define its physical characters. Medullary sarcoma is found in masses, generally of a rounded form, which present two appearances: part of the tumour resembles the medullary matter of the brain in colour and consistence; there appear to be vessels pervading it; or it is evidently something more than a mere secretion without definite relation to vessels. Other parts of the tumour look like firm coagula. Or sometimes an entire medullary sarcoma presents the brain-like character alone, at other times the coagulum-like appearance. While in a third, and perhaps the most common variety, the two are combined. The term fungus hæmatodes, was invented to express the coagulum-like appearance. It is commonly used as synonymous with medullary sarcoma.

Medullary sarcoma of bone generally, if not always, arises in the cancellous structure. It is therefore usually attended with considerable pain; for the growth of the tumour is rapid, and the shell of the bone has to be partly absorbed, partly mechanically forced open from within. Left to pursue its course, the tumour causes the skin to ulcerate, and a soft dark-coloured fungus protrudes, from which blood and serum are discharged, and the patient sinks.

A patient, a middle-aged man, was admitted into the Middlesex Hospital with a swelling of the head of the tibia. The enlargement had been rapid and painful: it had formed within the few preceding months. The day before his admission, a surgeon had opened the tumour, which felt soft and doughy, and had forced out about a pound in weight of medullary substance. The following day I amputated the limb above the knee. The head of the tibia was found expanded into a thin membranous shell, with very little bony matter in its texture, the cavity being occupied partly with soft yellowish substance resembling the medulla of the brain, partly with coagulum. The deposit of medullary substance extended some distance into the cancelli of the shaft of the bone. [*d.* 79.]

The tibia, humerus, femur, are the bones most commonly attacked with medullary sarcoma: the other bones of the extremities occasionally. The flat bones, however, do not escape. I have seen the disease in the ilium and in the cranial bones [*d.* 81.], and in the sternum and ribs. [*d.* 81*.]

I have known an instance, in which a medullary tumour in a rib was so circumscribed and moveable, as to have been supposed a tumour of the breast, which the surgeon, as he told me, would have thought of removing by an operation, but for the evidence of other and coexisting disease.

4. *Fibrous Sarcoma.*—There is a form of malignant disease of bone, of which the texture is firm, white, and fibrous. Its origin, I believe, and its place, to be exclusively periosteal.

This disease is met with on the tibia. If simply removed from the bone, it grows again: the limb must be amputated. [*d.* 83.]

The same growth is liable to form upon the cranial aspect of the dura mater, to push its way through the bone by absorption, and to project great masses of sarcomatous growth upon the head and face. [*d.* 82.]

5. *Cystlike Tumour.*—In the heads of the bones of the extremities, and in the lower jaw, a disease, which has the general characters of malignant growth, is found, when examined after death or amputation, to consist in a great cyst, or series of cysts, containing gelatinous liquid. It is probable that these tumours have some relation, as yet undefined, to fungus hematodes. [*d.* 86. 87.]

6. *Melanosis* is sometimes, but rarely, met with in bone. Mr. Langstaff has more than one specimen of this dis-

ease. In all its habitudes it resembles medullary sarcoma.

The diseases which have been enumerated are as often met with combined as separately.

Mr. Stanley possesses a specimen of ivory exostosis combined with medullary sarcoma.

Mr. Stanley gave to the King's College museum a section of a tumour upon the femur, which he had amputated. It consists, at one part, of medullary sarcoma; at another, of fibrous sarcoma. The medullary sarcoma appeared to have originated in the cancelli of the bone, and had caused absorption of the cortex, which became extenuated, and the femur broke. The fracture is surrounded by a large soft tumour; part of this tumour is medullary, part consists of a firm, white, opaque substance not cartilaginous. [*d.* 88. 89.]

In a leg amputated at the Middlesex Hospital for malignant disease, the cancelli of the tibia contained brain-like substance, or true medullary sarcoma. The crust of the bone was thin and brittle. The muscles of the back of the leg were externally healthy; but near the bone, in place of their proper texture, there was substituted a firm white substance corresponding to Mr. Abernethy's description of mammary sarcoma. The fore part of the leg had a remarkable tenseness and brawny hardness: the skin was red and thickened. The former appearances were produced by a very singular lobulated subcutaneous texture, to which Mr. Abernethy's term of pancreatic sarcoma was strikingly applicable. This part of the disease appeared to me a conversion of the adipose tissue into a malignant growth. [*d.* 90.]

There is an excellent case related in the 120th number of the Edinburgh Medical and Surgical Journal, illustrating at once the connexion between osteo-sarcoma and medullary sarcoma of bone, and a remarkable feature, which is occasionally present in the latter disease—a pulsation, namely, as if the tumour were aneurismal. The pulsation is probably communicated from the contiguous arterial trunk.

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ondon several other preparations of a similar description. ut I am not acquainted with an instance of an undoubted irrhous *enlargement* of bone.

Mr. Sweatman has a remarkable specimen of scirrhous peri-steum. A woman, about seventy years of age, was a patient the cancer ward of the Middlesex Hospital for carcinoma the breast. About a month before she died, one eye was served to protrude; and three days before her death she ecame suddenly comatose. Upon examining the skull, e dura mater and pericranium, and orbital periosteum, for considerable extent on the affected side of the head, were ound to be thickened and hard: the dura mater was, at ne part, a third of an inch in thickness; the arachnoïd dhered to it, and partook in the same thickening. The one is not diseased, but is something more vascular than sual.

In the museum of the College of Surgeons there are everal specimens of thickening of the pericranium and ura mater. No. 607 is a section of the right temporal and arietal bones of a young woman, twenty-five years of age. A tumour projects externally, about half an inch above the urface of the parietal bone; and there is a similar tumour situated exactly opposite, on the inside of the skull. These tumours appear, in the preparation in spirits, not unlike that just described, except that the part towards the skull appears opaker than the rest. The opposite section, however, is preserved dried; by which means the opaker part is shown to consist of short bony threads, in close apposition, which have no continuity with the cranial bones, on which they rest, but must have formed within the tumour. The tumour I suppose to have been malignant periosteal growth. The intervening portion of the cranium is sound, but unusually vascular.

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[illegible] these circumstances, on the th
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[illegible]mour filled again, and the same process was
[illegible] By February greater increase had taken place.
[illegible] base of the tumour was elevated, and its circum-
[illegible] enlarged. From this time, till December, attempts
[illegible] made to destroy the cyst by caustic potass, sulphate
[illegible] copper, arsenic; but these remedies produced so much local and general irritation, that they were discontinued, and a second operation was resorted to.

December 5, 1817, the integuments were turned back from the outer surface of the prominence, so as to expose the whole circumference of the base. The lower portion was then removed by a strong metacarpal saw, and afterwards the upper portion; so that the whole prominent bony ring was sawn through close to the sound and healthy surface of the surrounding bone: the largest diameter of the bone thus cut through by the saw was four inches and a half, the smallest diameter four inches. In the very hard and compact bony substance at the base of the tumour were found five or six cells containing hydatid cysts. Three of these cells, in the upper part of the base, were divided by the saw through their centres, and two or three in the lower portion of the base; so that the inferior sections of the cells or cavities were left as depressions of the surface, and lined with corresponding portions of the cysts: these cysts were carefully removed, and the bone exposed. The original large cavity, which had formed the centre and greater mass of the tumour, from whence there had been such a

CHAPTER II.

THE JOINTS.

HE joints are of two kinds. In one there is no disconti-ity: the bones which enter into the joint are united by intervening layer of fibro-cartilage; and the articulation strengthened externally by ligamentous bands, which tch from bone to bone over the uniting medium. Joints this kind are called synarthroses. In the other joints, continuity exists: the ends of the bones are tipped with rtilage, and tied together by a capsular ligament: but er both cartilage and capsular ligament a synovial mem-ane is reflected, which preserves and lines the articular vity. Joints of this second kind are called diarthroses.

SECTION I.

Of Synarthroses.

ynarthroses exist between the bodies of the vertebræ, between the pelvic bones. These, although the simplest s, are yet parts of so complicated a nature, as to render steps necessary in describing their pathology: the first hich is, the consideration of the different affections to each of the elements of the joint is liable; the second, umeration of the different disorders, in which these ions are grouped as practical studies.

e tissues, which enter into the composition of synar-s, are three; bone, fibro-cartilage, ligament.

1st, The kind of bone, which enters into the structure of synarthroses, has a thin external crust, and a close and strong cancellous structure.

a. It unites readily when broken.

b. It is liable to atrophy, in the two forms of rachitis and mollities ossium.

c. It is readily absorbed through pressure made by a growing tumour of the adjacent soft parts.

d. It is susceptible of inflammation. When inflamed, it rarely becomes hard and compact. It rarely is the seat of abscess. It frequently becomes softened, from absorption of its earthy matter, when it presents one of two appearances — either the internal periosteum highly vascular, and the cancelli filled with brownish gelatinous fluid — or with a less degree of vascularity, the cancelli filled with yellow curdy matter. Either of these states is eventually followed by caries, or ulceration; which ordinarily commences on a surface of the diseased bone, not in its interior; and is liable to be attended with partial necrosis.

2d, The fibro-cartilages in the synarthroses are generally not homogeneous; or there is every variety among them, from the sacro-iliac joint, in which the medium of union is nearly uniform, a layer of elastic substance, between cartilage and yellow ligament in structure,—and the pubic synchondrosis, where the exterior layers are more dense and fibrous than the central part, — to the fibro-cartilages between the bodies of the vertebræ, of which the exterior part, consisting of strong, white, silvery fibres, approaches to common ligament, while the interior part, a tissue *sui generis*, is of a soft and almost pulpy consistence, yet gliding, without any abruptness of transition, into the texture of the outer and ligament-like portion.

a. Fibro-cartilage, when torn, is susceptible of reparation. In fracture of a vertebra, the adjacent fibro-cartilage is generally ruptured; if the patient lives, it unites just as bone unites. The texture of the cartilage of a rib is perhaps too dissimilar to that of intervertebral substance, to be used in illustrating the properties of the latter; but I may take the present opportunity of mentioning some experiments made by myself upon reunion of these parts. The cartilage of a rib was divided in several animals, which were killed at different periods afterwards. I found the initiatory stages of reparation which had been set on foot to be exactly similar to those in bone. The cellular membrane surrounding the divided part was first consolidated into a firm capsule, which contained the cut ends of the cartilage. This consolidation was produced by infiltration with lymph; an exudation of the same substance formed a medium of direct union between the ends of the divided cartilage. The reparatory capsule gradually became converted into a texture resembling cartilage. As, in the reparation of bone, the callus changes into cartilage, and then ossifies, subsequently to which direct union of the broken ends by bone takes place, so, in the restoration of a costal cartilage, the exterior thickening becomes cartilaginous, while the direct union of the divided ends is still by lymph alone.

b. Fibro-cartilages are susceptible of absorption through pressure made upon them by the growth of tumours, but in a less degree than bone. Accordingly, in the growth of an aneurism of the descending aorta, the intervertebral fibro-cartilages are found to be absorbed superficially only, when the bodies of the vertebræ are already deeply excavated. [*b*. 9.]

c. The intervertebral fibro-cartilages probably participate in that weakness, or mode of atrophy, through which, in young persons, the vertebral column becomes laterally bent.

d. Fibro-cartilages generally, it may be presumed, are susceptible of inflammation. The only instance, however, in which I have found this demonstrable, occurred in the semilunar cartilages of a knee-joint. Ulceration of the cartilages covering the bones had taken place, with high inflammation of the adjacent surface of the bones, and of the capsular synovial membrane. The semilunar cartilages (the knee having been injected after amputation) were red with the vermilion, swollen, and softer than natural; and when divided, showed, upon the surface of the section, extremities of cut vessels. [*g*. 61 *.]

e. Ulceration and suppuration may occur in fibro-cartilage. In a case communicated by Mr. Howship to Sir Benjamin Brodie, in which, upon dissection, no remains were found of the intervertebral cartilages between the tenth and eleventh dorsal vertebræ, nor between the third and fourth lumbar — these intervertebral spaces being filled with pus, and the opposed surfaces of the vertebræ carious, but to a small extent only — the *central part* of the intervertebral cartilage, between the ninth and tenth dorsal vertebræ, had been completely absorbed, and pus was found in its place. Externally to this the concentric layers of elastic cartilage were entire, though somewhat altered from their natural appearance.

f. Portions of fibro-cartilage sometimes become detached in the progress of ulceration; they are then as dead matter, irritants to the adjacent living textures. Like more vascular parts, fibro-cartilages are liable to mortify.

3d, The affections of ligament will be more fully considered hereafter. It is sufficient to mention at present, that the ligaments are readily repaired when torn; that they are susceptible of atrophy and elongation — of inflammation, softening, ulceration, sloughing.

The diseases of the vertebral column admit of being classed under two heads — atrophy, namely, and inflammation. To the first head belong weakness of the spine in young persons, the yielding and curvature in rachitis, and the softening in mollities ossium. These have been already adverted to.—See Section 3, Chapter I.

Under the second head may be considered the instances which are usually classed together by the term spine disease. In introducing this principle of classification, however, I am bound to state that there is not evidence enough to authorise my asserting, as a thing proved, that all cases of spine disease are produced by inflammation, although I strongly anticipate that this will be found to be the fact. Sir Benjamin Brodie, who has contributed in so great a degree to the elucidation of the diseases of joints, does not appear to admit this view of the subject. After drawing an important distinction, which originated, I believe, with him, between cases where the vertebræ are first affected, and cases in which the intervertebral substance is the part primarily diseased, he notices, *as a third division*, "another order of cases, but of more rare occurrence, in which the bodies of the vertebræ are affected with chronic inflammation, of which ulceration of the intervertebral cartilages is the consequence." My own impression is, that all these affections begin with inflammatory action; sometimes affecting a single bone; sometimes two or more adjacent bones; sometimes the whole extent of the vertebral bones; sometimes affecting the fibro-cartilages alone; sometimes attacking both systems at once; — but in every case leading eventually, unless checked by judicious management, to ulcerative disease of both, that affords evidence by the greater ravage it has committed of one or other tissue, as to which was primarily affected.

The two following cases exemplify commencing inflammatory disease of the vertebral column.

A young lady, when wheeling a heavy garden-chair, was conscious of having strained her back; but the sensation wore off. In a few days, however, she found that the least exercise brought on pain in the lumbar portion of the spine. This was followed by pains in the left thigh and leg, and subsequently, but not to the same extent, in the right. Two months after the complaint began, I saw this patient: there was no irregularity of the spinous processes of the lumbar vertebræ, or tenderness on pressing the adjacent region; pain only, and a sense of weakness, were present. By perfect quietude, and preserving the horizontal posture almost constantly, joined with the use of caustic issues applied over the seat of pain in the loins, this patient in a year was entirely restored.

A young woman was admitted an in-patient of the Middlesex Hospital, with the following symptoms. She suffered constant pain in the whole length of the vertebral column, which, when lightly struck, communicated a sensation of soreness through the bones. There was no projection of the spinous processes at any point: her right side and right arm and leg were deficient in sensibility, and

[illegible]

[illegible] softer than [illegible] common [illegible] thumb and fingers. The ... of the second and third [illegible] cartilage between them, at the ...sively destroyed by ulceration. ...d the intervertebral cartilages were ... in a perfectly natural state; but the ... of a dark and almost black colour."

...dissections, as in all other instances of ...disease, the prominent features and dif-...nd in the situation and extent of the ulce-... in these, as in all others, I believe evidence ...nctly traced of primary inflammatory action ... g. 64. g. 65.]

...tures of spinal disease are the obvious and neces-...sequences of the morbid changes which have been ...bed.

The vertebral column, attacked with inflammation of the ...ones or fibro-cartilages, or both, becomes, at the part diseased, weak and painful.

The bodies of the vertebræ or the intervertebral substance being partially absorbed, there is loss of substance in the front of the vertebral column, which causes it to bend forwards, giving an unnatural projection to the spinous processes.

The vertebral column, being weakened by absorption of one or other of its constituents, is liable, on any accidental violence, to give way suddenly, or to become suddenly bent at the ulcerated part. In the majority of instances, however, the curvature takes place very gradually.

The spinal marrow, being either compressed by the flexure [illegible] of the lower [illegible] of the legs, and [illegible] the bowels [illegible]

[illegible] sympathy. [illegible]

[illegible] advanced as [illegible] arrested. [illegible] of recovery from the [illegible] stage.

[illegible] stage has set in, and the intervening [illegible] the bones, [illegible] being permanently [illegible] The [illegible] of the fibro-cartilage neces- [illegible] the spine [illegible] permanently at the [illegible]

[illegible] matter has [illegible] recovery may take place. [illegible] years of age, had all the symptoms [illegible] projection at the middle [illegible] a year, and had issues [illegible] to have perfectly reco- [illegible] some prominence [illegible] processes. She re- [illegible] of her former com- [illegible] admitted into the Mid- [illegible] bowels, diminished feeling [illegible] of urine. Not- [illegible] resorted to, she became [illegible] recent action appeared [illegible] back. What is to be described [illegible] former attack. Upon dis- [illegible] vertebral column, a strong mem- [illegible] of the part diseased. This [illegible] inspissated matter nearly as thick as [illegible] contained fragments of bone, which appeared to have been small portions detached from the vertebræ. The body of one vertebra had entirely disappeared, with the cartilages on either side of it. The bodies of the two adjacent vertebræ had likewise lost half their volume by absorption. They were not softened, nor had anchylosed by bone, but were partially united by firm, soft substance, allowing some degree of motion.

Disease of the pelvic joints is of unfrequent occurrence. At the time of labour, however, an affection occasionally takes place in these joints, which is sometimes decidedly inflammatory, while at other times it bears the character of simple absorption of the fibro-cartilage. I witnessed an instance in which, after labour, an abscess formed behind the symphysis pubis, which was attended by a sense of weakness and giving of the pubic joint, which lasted several weeks, but gradually went away. Cases of this description are the most common. But sometimes the sacro-iliac joints are principally affected: there is no suppuration, but extreme weakness at these joints, which lasts many months. The patient is obliged for a long period to keep the recumbent posture; and then, and afterwards while recovering strength, derives remarkable comfort from bandages round the pelvis.

The following case, which was under my care, exemplifies commencing disease in the sacro-iliac synchondrosis, brought on by external violence.

A gentleman was riding in Hyde Park, when his horse reared, and fell backwards, bearing him to the ground. He was lifted up by those around, when he found himself capable of walking, with assistance. I saw him a short time after the accident. The only part bruised was the integument covering the back of the sacrum, and more to the right side than the left. There was no fracture that I could ascertain, nothing but the bruise; and, as it afterwards appeared, a strain of the right sacro-iliac joint. The patient could bear the ilium to be pressed in any direction, and could, as I have mentioned, both stand and walk. In the evening considerable pain came on: he was cupped upon the hip, and experienced relief. The following day the cupping was re-

[illegible] [redacted] this patient had kept [illegible] left him, he went, for [illegible] when a child accidentally [illegible], he drew up the limb [illegible] a sensation, which he [illegible] the bones at the right [illegible] recollected, that, at the [illegible] lar sensation: but cer- [illegible] did pressure upon the [illegible] -iliac joint, bring on [illegible] any thing like sensible motion of the [illegible] became gradually very severe, and ex- [illegible] limb, in the course of the sciatic nerve. [illegible] and a half from the occurrence of the acci- [illegible] patient had recovered. In this period many [illegible] tried: those which were most beneficial were, [illegible] of rest, and the application of caustic [illegible] the joint. When by these means the pain had [illegible] subdued, cold sea-bathing rapidly restored his strength.

SECTION II.

Affections of Diarthroses.

Diarthroses are those joints in which there is discontinuity. The ends of the bones articulated by diarthrosis are crusted with cartilage, and held together by a capsular ligament, a shut sac of synovial membrane being reflected over, or lining, the articular cartilages and capsular membrane. The articular cavities of several of these joints are further deepened, or their shape somehow modified, by the introduction of a margin, or interposed plate, of fibro-cartilage. The tissues, therefore, which enter into the construction of diarthroses, are bone, cartilage, synovial membrane, ligament, fibro-cartilage.

I. The bones, or parts of bones, which go to form diarthroses, are the extremities of the cylindrical bones, the bones of the wrist and instep and phalanges, the articular processes of the vertebræ, the condyles of the occipital bone and of the lower jaw, the articular cavities of the scapulæ and ossa innominata, the heads of the ribs, and the edges of the dorsal vertebræ. The affections of these bones, in which the joints are implicated, are the following: —

a. Restorative action after fracture.

b. Atrophy.

c. Eburnation, or the solidifying into a texture like ivory. In connection with joint diseases, this change occasionally supervenes in surfaces of bone from which the articular cartilage has been absorbed. The ends of bones, which have become eburneous on their surface, are enlarged; the eburnation does not extend to a greater depth than from two to four or five lines. This ivory bone resembles the dense osseous texture which forms the large and *malignant exostoses*.

d. Inflammation, producing as consequences—in the articular ends of the long bones, consolidation, and abscess which may open into the neighbouring joint — in each of the kinds of bones specified, softening, with increased vascularity of the surface of the bone in contact with the articular cartilage — in each kind again, softening, with gelatinous deposit in the cancelli — in each again, necrosis.

e. Deposit of scrofulous matter in the cancelli.

2. The changes which have been observed in articular cartilages are the following: —

a. Cartilage is susceptible of reparation. In oblique fractures of the extremities of the long bones, and in the fractures of several other bones, the articular cartilages are broken or ruptured. In a simple fracture, which extends into a diarthrosis, as the bone unites, so does the cartilage: the rent surfaces are found to adhere together by a layer of effused lymph: at the same time the sharp edges of the cartilage become a little rounded by absorption, presenting an appearance not unlike the rounding of the edge of a fractured cranial bone. Whether the uniting medium finally becomes cartilaginous is unknown to me. The rounding of sharp edges, and deposit of lymph, are sometimes met with, constituting reparatory processes, after ulceration of

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ubstance, according to M. Lau-

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te of calcium	1
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Synovial membrane is liable to many changes.

a. It unites readily when torn or divided.

b. It is highly susceptible of inflammation. When inflamed, where it lines the capsular synovial membrane, or covers bone, it is liable to become thickened by an effusion of lymph upon its surface, resembling a growth of granulations,—at first soft and vascular, afterwards occasionally becoming hard and gristly: where it is reflected over cartilage, it is liable to become slightly thickened, opaque, easily separable from the cartilage, elastic and brittle. I have once seen it for a small extent thickened, firm, white, and soft, on the patella, in connection with sensible vascu-

[illegible] cartilages. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] blended [illegible]

[illegible] is liable to grow [illegible] [illegible] in its texture, [illegible] [illegible] is a soft substance [illegible] light brown colour, inter-sected by [illegible] lines and vessels. This formation, [illegible] [illegible] of a [illegible] to half an inch, [illegible] of the membrane indifferently. A [illegible] development of the first only, [illegible] which has [illegible] cavity. A third is the growth of one or more bodies, resembling cartilage in consistence, [illegible] membrane. These are the bodies, which, when detached by the motion of the joint or [illegible], become loose cartilages. A fourth, a growth of [illegible] bodies [illegible]. A fifth, a growth of small [illegible] resembling melon seeds; [illegible] which [illegible].

The synovial membrane is liable to be the seat of gouty [illegible]

Ligament exhibits the following changes:—

1. It unites readily when divided or ruptured, the process being exactly analogous to that of the reparation of bone.

2. It is liable to atrophy. Through disuse, ligaments become weaker and are liable to become elongated.

3. Ligament is susceptible of inflammation. I cannot, however, say that I have seen, after death, what was identified as inflamed ligament; but in rheumatism, gout, and syphilis, it is impossible to doubt the existence of inflammation of this tissue. In joints, of which the other tissues have been the seat of inflammation and ulceration, the ligaments are found softened, and less opaque than natural.

4. The gouty concretion is met with in ligament.

The changes, which have been enumerated, are the ele-

its of the pathology of joints. But it is not in this is-
ited state that they form a useful or practical study. It
urther necessary to consider the combinations in which
e elements of disease are usually grouped, so as to form,
e expression is allowable, different natural families of ar-
lar affections. These groups of pathological phenomena
governed each by its own laws, and claim importance each
separate studies. They are not, however, it must still
emarked, each so distinct from the rest, but that two
uently coexist, and modify each other. Thus, a sprain
different study from the gout; a loose cartilage from
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. Injury and reparation.

Inflammation of ligaments.

. Heightened sensibility of the synovial membrane, car-
ges, and ligaments.

Inflammation of the synovial membrane with increased
retion of synovia, from local causes.

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6. Inflammation and ulceration of the synovial membrane.

7. Inflammation of the synovial membrane without effu-
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ated excavation of the articular cartilage beginning on
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9. Inflammation of synovial membrane with caries of the
ticular aspect of the bones.

10. Extra-articular inflammation, producing ulceration of
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11. Strumous caries of the ends of bones, producing arti-
lar ulceration.

12. Growths from the synovial membrane.

I. The phenomena attending injuries of joints and their reparation are various.

Simple rupture of the parts of a joint,—from a sprain in which a few ligamentous fibres alone are torn, to the laceration of two-thirds of the capsule and synovial membrane with dislocation,—are repaired with surprising rapidity. The process of reparation depends upon a thickening of the parts around the torn ligament, through effusion and infiltration with lymph resembling the provisional callus produced in the reunion of simple fractures. If inflammation follows, it is of the kind specified under the fifth head: but it is liable to be heightened by neglect and mismanagement into one of the severer forms of articular disease.

A wound exposing the cavity of a joint sometimes heals at once, the integuments uniting by adhesion. In the greater number of cases, however, wounds of joints are followed by acute inflammation of the synovial membrane, attended with rapid absorption of the exposed cartilage, and inflammation of the articular aspect of the bone.

After a wound which has healed by adhesion, inflammation of the fifth kind may supervene, and the joint become painfully distended with fluid. Under these circumstances, the wound may give way, and the relief thus obtained may be followed by diminution of the inflammation.

I attended, with Mr. Clayton of Percy Street, a gentleman, sixty years of age, of a full habit, corpulent, asthmatic, who, fourteen days before, had fallen out of bed, and received a severe wound of the outside of the knee through striking a chamber-pot, which was broken by his fall. The integuments, which had been cut through for the length of five inches, had been brought together by sticking-plaister; and the patient had been kept as still as an asthmatic cough and an irritable habit would allow. The synovial cavity was supposed not to have been opened. In the course of a few days the joint became swollen, tender, and painful. On the thirteenth day, the wounded integuments having granulated healthily, the granulations at the centre of the wound gave way, a gush of synovia took place from the joint, and the pain was relieved. The following day the distension and pain had returned. The point, which had before given way, was now opened with a probe; when the synovia escaped, and the pain was again relieved. After this occasion the joint did not require to be again artificially opened: the synovia escaped spontaneously, and continued to be discharged, lessening only in quantity (but never altering in quality) for two months. The joint then ceased to discharge, and what remained of the original wound closed.

This patient is now able to walk about tolerably well, the joint remaining only slightly swollen and weak.

After a small wound, *which has not healed,* into a large joint (the incision, for instance, into the knee to remove a loose cartilage), acute inflammation of the synovial membrane supervenes, followed by ulceration of cartilage, like that described under the eighth head. Such a case often proves fatal, unless the limb is amputated. Nevertheless, sometimes the diseased action subsides, and the ulcerated articular surfaces are glued together and permanently united by a layer of coagulable lymph, or are anchylosed.

After extensive exposure of the cavity of a smaller joint (the ankle, for instance), acute synovial inflammation supervenes, and with it entire and rapid absorption of the articular cartilage; so that in three to four weeks the bones are perfectly denuded. [g. 59.] The exposed surfaces then inflame, and pour out lymph; by which, under favourable circumstances, the bones become anchylosed, and recovery with a stiff joint follows.

The danger which attends these cases results from the sympathies of the joints with neighbouring parts, and with the constitution generally. Erysipelatous inflammation, and the formation of deposits of matter are liable to occur in the vicinity of the injured joint, attended with bilious and gastric disturbance or nervous irritation, or with hectic fever.

Such are the consequences of injuries of joints considered without reference to luxation of the bones.

Dislocations considered mechanically admit of being arranged in two classes. In one, the difficulty is to replace the luxated bones; in the other, to keep them in their places when reduced. The difficulties found in reducing dislocations cartilage has been arrested: the former occurring when the ulceration has removed a part of the thickness of the cartilage only; the latter, when the cartilage has been entirely absorbed. The same deposit of lymph is the medium of union in anchylosis, or when a joint becomes fixed after ulcerative disease. Anchylosis is osseous, cartilaginous, or mixed, according as the surfaces which are glued together are, both bone, or both cartilage, or one of each.

b. Cartilage is susceptible of two forms of softening; one may be considered true atrophy. It is often met with on the cartilage of the patella in persons a little advanced in years. The cartilage is softened, and seems split into soft, thick villi. The change is accompanied both by partial absorption of the cartilage, and by a growth of the ends of the isolated villi in delicate shreddy productions, to which the synovial membrane probably contributes. This condition of cartilage deserves to be viewed, not as disease, but as natural degeneration of tissue.

c. The second form of softening is of rare occurrence; in it the cartilage becomes semi-transparent and gelatinous. In a case of severe inflammatory disease of the knee-joint, with caries of the articular surfaces of the bones, and inflammation of the synovial membrane, I found near the crucial ligaments, for the extent a sixpence would cover, the synovial aspect of the cartilage on the inner condyloïd cavity of the tibia softened and semi-transparent for two-thirds of its thickness.

d. Cartilage is susceptible of three varieties of ulcerative disease.

In the first, the cartilage disappears very rapidly, the absorption beginning upon the synovial aspect, leaving a surface perfectly healthy and smooth, either of cartilage or of bone. This change supervenes with great rapidity after compound dislocations, in which the wound does not heal, and the cavity of the joint remains exposed.

In the second, the process of absorption is slower, and produces an irregularly excavated and ulcerated surface on the synovial aspect. This condition of cartilage is a very common element in chronic articular disease. I believe it to be generally, if not always, preceded by synovial inflammation. [*g*. 42.]

In the third, the process of absorption commences on the aspect of the cartilage towards the bone. I believe that this kind is essentially dependent upon inflammation of the articular aspect of the bone. The absorption takes place with two effects: one, the diminution of the thickness of the cartilage; the other, its detachment from the bone. [*g*. 57.]

e. I am inclined to suppose, that cartilage is susceptible of inflammation, or of some change analogous to it. In one preparation in our museum, injected vessels are seen to pass from the bone through the cartilage to its synovial aspect; and one of these distinctly anastomoses with a vessel on the inflamed synovial membrane covering the cartilage. [*g*. 56.]

f. The gouty concretion is met with in cartilage.

The components of this substance, according to M. Launier, are, [*g*. 35.]

Animal matter	2
Lithic acid	2
Lithate of soda	2
Water	1
Lithate of calcium	1
Hydrochlorate of soda	2
Lost	2
	12

3. Synovial membrane is liable to many changes.

a. It unites readily when torn or divided.

b. It is highly susceptible of inflammation. When inflamed, where it lines the capsular synovial membrane, or covers bone, it is liable to become thickened by an effusion of lymph upon its surface, resembling a growth of granulations,—at first soft and vascular, afterwards occasionally becoming hard and gristly: where it is reflected over cartilage, it is liable to become slightly thickened, opaque, easily separable from the cartilage, elastic and brittle. I have once seen it for a small extent thickened, firm, white, and soft, on the patella, in connection with sensible vascularity elsewhere on the patella and semi-lunar cartilages. The fluids found in the cavities of inflamed synovial membranes are, synovia scarcely changed, but in increased quantity—synovia thick, brown, and turbid—synovia blended with pus—pus—lymph.

c. The synovial membrane is liable to give origin to several new growths, the seat of which is either in its texture, or on its adherent surface. One of these is a soft substance of a pulpy consistence, and a light brown colour, intersected by membranous lines, and vascular. This formation, which attains the thickness of a quarter to half an inch, grows from every part of the membrane indifferently. A second is perhaps a partial development of the first only, and consists in a soft pedunculated tumour, which has some motion in the articular cavity. A third is the growth of one or more bodies, resembling cartilage in consistence, from the periosteal synovial membrane. These are the bodies, which, when detached by the motion of the joint or ulceration, become loose cartilages. A fourth, a growth of similar bodies that are ossified. A fifth, a growth of small soft substances in shape and colour resembling melon seeds; of smaller size, however, but always of a soft texture, which are liable to become detached.

d. The synovial membrane is liable to be the seat of gouty concretion.

4. Ligament exhibits the following changes:—

a. It unites readily when divided or ruptured, the process being exactly analogous to that of the reparation of bone.

b. It is liable to atrophy. Through disuse, ligaments become weaker, and are liable to become elongated.

c. Ligament is susceptible of inflammation. I cannot, indeed, say that I have seen, after death, what was identified as inflamed ligament; but in rheumatism, gout, and syphilis, it is impossible to doubt the existence of inflammation of this tissue. In joints, of which the other tissues have been the seat of inflammation and ulceration, the ligaments are found softened, and less opaque than natural.

d. The gouty concretion is met with in ligament.

The changes, which have been enumerated, are the elements of the pathology of joints. But it is not in this insulated state that they form a useful or practical study. It is further necessary to consider the combinations in which these elements of disease are usually grouped, so as to form, if the expression is allowable, different natural families of articular affections. These groups of pathological phenomena are governed each by its own laws, and claim importance each as separate studies. They are not, however, it must still be remarked, each so distinct from the rest, but that two frequently coexist, and modify each other. Thus, a sprain is a different study from the gout; a loose cartilage from articular caries; but a sprained joint may pass into gouty inflammation, and a loose cartilage may lead to articular ulceration.

The heads under which I propose to describe the affections of joints are the following: —

1. Injury and reparation.
2. Inflammation of ligaments.
3. Heightened sensibility of the synovial membrane, cartilages, and ligaments.
4. Inflammation of the synovial membrane with increased secretion of synovia, from local causes.
5. Inflammation of the synovial membrane with increased secretion of synovia, produced by causes of general or specific action on the constitution.
6. Inflammation and ulceration of the synovial membrane.
7. Inflammation of the synovial membrane without effusion, attended by rapid disappearance or absorption of the articular cartilages.
8. Inflammation of synovial membrane with chronic ulcerated excavation of the articular cartilage beginning on its synovial aspect.
9. Inflammation of synovial membrane with caries of the articular aspect of the bones.
10. Extra-articular inflammation, producing ulceration of cartilage, and caries.
11. Strumous caries of the ends of bones, producing articular ulceration.
12. Growths from the synovial membrane.

for some time unabated; but after several months it gradually went away, nothing being employed but fomentation of the knee with hot water.

H. A., ætat. twenty-two, the catamenia regular, having suffered during four years pain in the knee joint, which, although sometimes greatly mitigated, never entirely left her, at length, when every remedy that could be thought of had been tried, and the pain had much increased, underwent amputation of the leg. The symptoms had been pain and increased sensibility, and nothing more; the joint, with the exception of slight œdema arising perhaps from the local remedies, had not swollen, nor had there been any mechanical impediment to motion. On examining the amputated knee, which had been previously injected, the capsular synovial membrane was found of a bright red. The synovial membrane covering a small part of the semilunar cartilages was likewise very vascular. At the upper part of the patella, the same appearance was seen: towards the lower part, the synovial membrane, for the extent of five lines by two, was not only red with injected vessels, but considerably thickened. [*g.* 32.]

These appearances admit of being interpreted in two ways. The increased capillary vascularity of the joint may have been either the cause of the pain this patient suffered, or an effect of it. I am inclined to adopt the latter supposition. It is certain that influences upon the nerves are capable of producing, not pain alone, but even swelling about a joint: it is thus, that, in hip disease, the knee often becomes affected with symptomatic swelling, in conjunction with pain and tenderness. The further progress of the present case seemed to show, that the disease had been in the nerves, not in the organization of the joint. Soon after the stump had healed, it was accidentally struck. To this cause, probably without reason, the patient attributed a return of pain exactly similar to that which she experienced before the amputation of the leg. When the pain had gone on several months increasing in severity, the patient, anxious at any expense of immediate suffering to get well, submitted to another operation. The pain and tenderness were seated in the last three inches of the stump, not more upon one aspect than another, although most acute as it seemed in the part of the cicatrix covering the bone. The extremity of the stump was therefore amputated, a second portion of bone sawn off, an additional portion of the sciatic nerve taken off in the operation, and the bone and nerve buried in a full bed of relaxed muscle and integument. On examining the part removed, the sciatic and the saphenus nerves were found to terminate in large white cartilaginous bulbs, behind but not adhering to the cicatrix. It is distressing to have to relate, that, on the stump healing, the pain recurred. After some months, the pain continuing, the sciatic nerve was divided under the edge of the glutæus muscle. Again, that is, while the wound was green, her sufferings were mitigated; on its healing, they have recurred. It is needless to say that every remedy local and general, upon every plan, and the intermission of all remedies, were tried, before the repeated operations were resorted to.

These complaints, it is to be concluded, are neuralgic. There is a specimen in the museum of St. Bartholomew's Hospital, from a patient with parallel symptoms, where even the place of the disease in the nervous system admitted of being shown. A patient, after years of suffering, had her knee amputated: no appearance of disease was found in the joint. Upon her death, which happened, if I recollect right, within two or three years after the amputation, the spine was examined, when the posterior or sentient surface of the chord was found studded with little plates of cartilaginous and bony deposit.

IV. Inflammation of the synovial membrane, with increased secretion of synovia more or less altered in character, and attended with more or less thickening of the membrane [*g*. 38.], is a frequent consequence of injuries or exposure to cold. This is perhaps the least serious form of synovial inflammation. The capillary action, finding vent in increased secretion, does not, as in instances which will subsequently be described, lead to disease of the cartilages or bones. The following case may be given as an example of this affection.

Hannah Welsh, ætat. twenty-one, was admitted into the

Middlesex Hospital, in April 1833. Four years before, after kneeling on a stone floor, the knee suddenly swelled, and became painful. She continued, however, to get about. At one time the pain would be greater, at another less. At the time of her admission, the cavity of the knee was distended with fluid, the patella was lifted from the condyles, around and above it there was swelling with sensible fluctuation; the form of the articulating ends of the bones was completely lost. The synovial membrane could be felt, at its reflection from the femur to the capsular membrane, to be considerably thickened. The joint was painful and weak: the pain was aggravated on motion: there was no roughness of the articular surfaces, but pressing them together caused pain. The patient left the hospital in January 1835, with all these symptoms removed, the pain and the effused fluid gone, the strength of the joint restored, the thickening of the synovial membrane sensibly lessened. Leeches and fomentations, blisters, superficial issues, bandaging with mercurial ointment, employed in succession, were each in turn beneficial.

A case has been already mentioned, in which inflammation of the kind now described occurred in consequence of injury of the knee joint, and in which the fluid having once escaped spontaneously, was *afterwards let out*, and then continued to discharge itself with great relief to the patient. The same practice may be resorted to where there has been no wound, if the distension of the joint is so great as manifestly to heighten the pain and inflammation. Upon this subject Sir Benjamin Brodie makes the following remarks:—

"1st. In a thin person, if a few punctures be made with an instrument a very little broader than a couching needle, by means of an exhausted cupping glass applied over the punctures, a large quantity of fluid may be easily abstracted without the smallest danger, and with no inconsiderable relief to the patient. But while inflammation exists, the relief is not permanent, the fluid being rapidly regenerated; so that in a day or two, or perhaps in a few hours, the swelling is as large as ever. If, on the other hand, the inflammation be already subdued, the absorption of the fluid usually goes on so rapidly, that any more expeditious method of removing it is unnecessary. 2dly, If suppuration has taken place in the joint (not in consequence of ulceration, but from the surface of the synovial membrane), a free opening made into it with a lancet will often be attended with the best effects. I have known, under such circumstances, anchylosis to become established almost immediately, and the patient to obtain a speedy cure with an anchylosed joint. The most prudent method of proceeding is to make a puncture with a needle first, and allow a small quantity of fluid to escape, so as to ascertain its nature. If it be not simple turbid serum, but actual pus, the lancet may be used afterwards."

In Case XIV, in Sir Benjamin Brodie's work, in a patient, ætat. thirty,—in whom both knee joints had been swollen and painful in October 1827, on the subsidence of an inflammatory affection of the chest, but had nearly recovered,—in December the right knee became inflamed. On the 21st of February, the knee was much distended with fluid. The patient complained of constant pain in the joint, and of painful startings of the limb at night, by which he was frequently awakened from his sleep. The pain was aggravated by every motion of the joint, and by pressing the articulatory surfaces against each other. The pulse beat 100 in a minute. Blood was taken by cupping, and the *pulvis ipecacuanhæ compositus* was directed to be given every night. Afterwards the cupping was repeated; and ʒss of the *vinum radicis colchici* was administered three times daily for three successive days, when it was discontinued on account of its having acted considerably on the bowels. Under this treatment, however, little or no amendment took place with respect to the local disease, and the pulse rose to 108.

March 17. On the supposition that the fluid in the joint might be purulent, and to ascertain the fact, the knee was punctured with a narrow sharp-pointed instrument; when a cupping-glass being applied over the puncture, between two and three ounces were drawn off, not of pus, but of turbid serum, with small flakes of coagulated lymph floating in it.

[illegible] became swollen from [illegible] membrane, but not i[illegible] other times, and the swelling [illegible] any perceptible swelling o[illegible]

[illegible] pains were abated. The eye [illegible] free from inflammation, and [illegible] scarcely perceptible.

[illegible] free from pain except on mot[illegible] had been affected, were stiff; but he [illegible] as common.

[illegible] progressively receded. The stiff[illegible] diminished very slowly; but he was free f[illegible]. He was longer in recovering the use of [illegible] than in the other joints.

[illegible] following December, 1817 (at which time he h[illegible] completely, recovered the use of his limb[illegible] another attack of the complaint. The sympto[illegible] same as formerly, taking place in the same ord[illegible] the same course, but with a much less deg[illegible]. The second attack lasted about six weeks, a[illegible] considerably crippled.

[illegible] March, 1818, he became affected with an ophth[illegible] of a different nature from that which he laboure[illegible] the preceding summer. The inflammation wa[illegible]

[illegible]
[illegible] inflammation [illegible]

as been [illegible] in the cartilages [illegible]
al membrane. The [illegible]
ained more frequently, [illegible]
he ligaments, and the [illegible].

Inflammation of the synovial membrane [illegible]
ration and ulceration of that membrane [illegible]
y rare form of articular disease. The [illegible]
to exemplify it are taken from Sir B[illegible] B[illegible]
e already referred to.

young lady, nine years of age, being at play [illegible]
January, 1808, fell and wrenched her hip. She ex-
ced so little uneasiness, that she walked [illegible]
s usual. In the evening she went to a [illegible]
there was seized with a rigor; was carried [illegible]
o bed. Next morning she was much indisposed, and
lained of pain in the thigh and knee. On the f[illegible]
lay she had pain in the hip, and was very feverish.
e symptoms continued: she became delirious, and she
just a week from the time of the accident.

n inspecting the body on the following day, the vis-
of the thorax and abdomen were found in a perfectly
hy state. The hip joint on the side of the injury con-
d about half an ounce of dark-coloured pus; and the
rial membrane, where it was reflected over the neck of
emur, was destroyed, by ulceration, for about the extent
shilling.

[illegible] The [illegible]

[illegible] and [illegible]

[illegible] of the [illegible]

[illegible] the [illegible]

[illegible] likewise of [illegible]

[illegible] in a paper [illegible]

[illegible] Transac[illegible]

[illegible] inflammation of [illegible]

[illegible] articular [illegible]

[illegible] but with [illegible]

[illegible] The [illegible]

[illegible] swelling [illegible]

[illegible] and it [illegible]

[illegible]

[illegible] The
[illegible]
[illegible]
[illegible] small
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
was seized with pain
she complained that she
the pain had shifted to
excessively severe, and
as swelled above and below
ghtly reddened and swelled
rm without any benefit, and
vicinity of the joint which
ine cerate. Under this treat-
as beginning to be reduced, when
increased violence, the arm be-
d the skin covered with a bright
Leeches were repeatedly applied.
An erysipelatous inflammation now
e arm, and spread over her neck and
became remarkably irritable, so that
vomited every thing that she took, and
ly reduced. A fluctuation could now be
de of the fore arm, near the elbow joint.
his part, a small quantity of pus escaped
not long in closing. The patient now re-
ength; her arm gradually returned to its
but the elbow joint was completely anchy-

ese cases, the period between the commence-
e attack and the completion of the anchylosis
ning more than two months.
ter the cases which I have described occurred, I
pportunity of making the following dissection:
y, fourteen years of age, died of an [illegible]
onnected with fracture of the skull. H [illegible]

[illegible] that [illegible] not comm[illegible] [illegible] ular synovi[illegible] [illegible], but contained [illegible] affected finger, [illegible] years." [illegible] ially bared of cart[illegible]

[illegible] On exposing the cavi[illegible] [illegible] scapulae and tibia [illegible] [illegible] stripped of their cartilag[illegible]

[illegible], but seemed in other [illegible] adhered firmly to [illegible] [illegible] was found in the othe[illegible] [illegible] bone part the exposed [illegible] [illegible] the case last described, as fa[illegible] [illegible] affection was concerned, to [illegible] [illegible] that the morbid ch[illegible] [illegible] Four years afterwards, I [illegible] [illegible] the correctness of this supp[illegible] [illegible] that the second patient died [illegible] [illegible] enabled me to examine the elbo[illegible]

[illegible] I found in it, as I had antic[illegible] [illegible] between the humerus and ulna. [illegible] The [illegible] was admitted into the Middlese[illegible] [illegible] summer of 1828, four or five weeks a[illegible]

l being healthy. The
her parts was uniformly
ngly adherent to the bone,

iously in good health, in the
y, 1835, awoke from sleep with
companied with swelling of the knee.
, the character of which she described
ing, continued to increase for a fortnight,
l stationary for six weeks to two months.
fomenting and leeches only appear to have
Small superficial issues were now tried; and at
me the pain began to abate, and with it the œde-
swelling. When the pain was at the worst, the
was drawn to semiflexion: on its subsidence, the joint
came nearly straight, in which position anchylosis has taken place. Now (June 27), for two months, the joint has been entirely free from pain during the greater part of the twenty-four hours; but still no day has passed without occasional fits of the original pain.

VIII. Chronic articular disease, of which the principal and early feature is ulceration of the synovial aspect of the cartilages, was first correctly described by Sir Benjamin Brodie; and shown to be a very frequent form of disease, and one which, at an early stage, yields readily to appropriate treatment.

In this disease, the cartilage presents some slight varieties of appearance: there is either an irregularly excavated ulcer, [g. 42.] or the synovial aspect of the cartilage appears in parts simply absorbed, leaving a smooth surface; in other parts split into fibres, or short brush-like projections, or thick short villi of cartilage and synovial membrane, the bone and the layer of cartilage adhering to it being healthy.

The disease commences insidiously; for several months the patient experiences occasional pain only in the joint after exercise; the pain then increases in severity, and becomes constant; the joint finally swells, often suddenly, and with great increase of local pain.

[illegible]

[illegible] when she
[illegible]
[illegible]
[illegible] after [illegible]
[illegible]
free from pain

the pain, which had
after this period, she
after her admission she
l.

int, bony anchylosis was
ween the patella and outer
cartilaginous surface of the
. the ulceration was shallow,
gular, and uneven rather than
that it was a surface, which,
the former attack, had subse-
psular synovial membrane was in-
specially at the front of the joint,
membrane partially covered both con-

t. seventeen, was admitted into the
, June 18, 1833. The preceding April,
l anterior part of the left knee became
which she attributed to cold from kneeling
Cupping, poultices, and a liniment were
ht fulness went away, but a pain, which
om the first, deep in the joint, now increased.
n of a blister mitigated the pain for a time.
upping twice repeated, leeches, and the use of
rocation, had nearly removed it, when, upon
joint in walking, the symptoms became aggra-

r admission, but for a slight fulness to the outside

"A middle-aged man, who had met with a contusion of one shoulder, was admitted into St. George's Hospital in the winter of 1812. He complained of pain and tenderness of the shoulder, and a very slight degree of swelling was observable: but his principal disease was a fever, resembling typhus in its character, of which he died in a few days after his admission.

"On inspecting the body, about half an ounce of thin pus was found in the shoulder joint. The synovial membrane bore marks of general inflammation; and in one spot, where it was reflected over the neck of the os brachii, it was destroyed by ulceration for about the extent of a sixpence."

VII. A different class of cases, likewise of rare occurrence, was first described by myself, in a paper in the eleventh volume of the Medico-Chirurgical Transactions.

The disease consists in acute inflammation of the synovial membrane, with rapid absorption of the articular cartilage, attended, not with effusion into the joint, but with considerable œdema or suppuration external to it. The attack begins with sudden pain in a joint, and swelling round it, not attended with much symptomatic fever; and it frequently, in twenty-four to forty-eight hours, entirely leaves the joint first attacked, and settles in another. The pain continues for several weeks with hardly abated severity, then goes away, and the joint is found to be anchylosed. Leeches repeatedly applied, and superficial caustic issues, have appeared to me of manifest utility in lessening the pain.

A young woman twenty-seven years of age, six months after labour, was seized with pain and swelling of the wrist. The next day, the right knee was attacked in the same manner. The following day, the pain and swelling left the joints first affected, and attacked and settled in the left knee. Six weeks after the commencement of her illness, I saw this patient. At that time, by her account, no material change had taken place in the limb; the thigh and leg were swollen with serum effused in the cellular membrane; the joint contained no fluid; the pain in the knee was very acute and constant, and increased by the least motion; the patient lay on her back, with the knee straightened. The application of leeches to the part gave no relief; cold applications and fomentations were equally inefficient; repeated blistering appeared, at one time, to be of service; small doses of calomel and opium were administered frequently, during a few successive days, with no advantage. At length the pain seemed to abate spontaneously, the swollen state of the limb gradually subsided, the patient recovered the appearance of health, but the joint was wholly immovable.

A female, seventeen years of age, was seized with pain and swelling of the thumb, which she conceived that she had sprained. The following day, the pain had shifted to her elbow, where it rested, being exceedingly severe, and constantly throbbing. The arm was swollen above and below the elbow, and the skin was slightly reddened and heated; leeches were applied to the arm without any benefit, and subsequently a blister, in the vicinity of the joint, which was kept open with the savine cerate. Under this treatment, the pain in the elbow was beginning to be relieved, when it suddenly returned with increased violence, the arm becoming more swollen, and the skin covered with a bright blush of inflammation. Leeches were repeatedly applied without any relief. An erysipelatous inflammation now extended itself up the arm, and spread over her neck and chest; the stomach became remarkably irritable, so that for several days she vomited every thing that she took, and she became greatly reduced. A fluctuation could now be felt on the outside of the fore arm, near the elbow joint. On puncturing this part, a small quantity of pus escaped; the wound was not long in closing. The patient now regained her strength; her arm gradually returned to its former size, but the elbow joint was completely anchylosed.

In both these cases, the period between the commencement of the attack and the completion of the anchylosis was something more than two months.

Soon after the cases which I have described occurred, I had an opportunity of making the following dissection.

A boy, fourteen years of age, died of an affection of the brain, connected with fracture of the skull. He survived [illegible] after the accident, [illegible] swollen [illegible] distance above [illegible] fluctuation [illegible] suspicion that [illegible] suppurated, [illegible]

[illegible] that the ab- [illegible] communicate [illegible] no fluid. [illegible] finger, the extre- [illegible] cartilage; in [illegible] cavity of the [illegible] tibia and fibula [illegible] cartilage; what [illegible] other respects [illegible] firmly to the bone. [illegible] The same [illegible] was found in the other joints, [illegible] the exposed bone was [illegible]

[illegible] described, as far as the [illegible], to the two [illegible] the morbid change in [illegible] afterwards, I had an [illegible] of this supposition. [illegible] died under cir- [illegible] the elbow joint [illegible], as I had anticipated, [illegible] and ulna. [g. 40.]

[illegible] into the Middlesex Hos- [illegible] four or five weeks after her [illegible] emaciation, with a large [illegible] the thigh, extending from the [illegible] way to the groin. The abscess did not [illegible] which contained no fluid, but [illegible] The tibia was drawn backwards upon the [illegible]. In six weeks, this patient sank and [illegible] the knee joint, the cartilage of the [illegible] femur was found to be entirely absorbed towards the edge, the bone exposed being healthy. The cartilage covering the condyles at other parts was uniformly attenuated, but smooth, and strongly adherent to the bone, which was healthy. [*g.* 41.]

F. W., ætat. eighteen, previously in good health, in the night of the 28th of January, 1835, awoke from sleep with severe pain in the joint, accompanied with swelling of the knee, leg, and foot. The pain, the character of which she described as shooting and gnawing, continued to increase for a fortnight, and then remained stationary for six weeks to two months. For this period, fomenting and leeches only appear to have been used. Small superficial issues were now tried; and at the same time the pain began to abate, and with it the œdematous swelling. When the pain was at the worst, the knee was drawn to semiflexion: on its subsidence, the joint became nearly straight, in which position anchylosis has taken place. Now (June 27), for two months, the joint has been entirely free from pain during the greater part of the twenty-four hours; but still no day has passed without occasional fits of the original pain.

VIII. Chronic articular disease, of which the principal and early feature is ulceration of the synovial aspect of the cartilages, was first correctly described by Sir Benjamin Brodie; and shown to be a very frequent form of disease, and one which, at an early stage, yields readily to appropriate treatment.

In this disease, the cartilage presents some slight varieties of appearance: there is either an irregularly excavated ulcer, [*g.* 42.] or the synovial aspect of the cartilage appears in parts simply absorbed, leaving a smooth surface; in other parts split into fibres, or short brush-like projections, or thick short villi of cartilage and synovial membrane, the bone and the layer of cartilage adhering to it being healthy.

The disease commences insidiously; for several months the patient experiences occasional pain only in the joint after exercise; the pain then increases in severity, and becomes constant; the joint finally swells, often suddenly, and with great increase of local pain.

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[illegible] of this accident and

y symptom which she distinctly remembered. The joint that period became suddenly swollen and painful; but eches, cupping, fomenting, blisters, and an issue, had in ur months nearly removed the pain and swelling, when she ll again and struck the knee. The symptoms immediately turned with aggravation, and the knee was drawn into a miflexed position. The treatment which had before been f service was again resorted to successfully: after perse- ring in it for some time, bandaging, with mercurial oint- ent, was used. The knee became nearly free from pain, nd straight, but the joint was stiff.

She now ventured to walk, when the pain, which had ever wholly gone, increased. Soon after this period, she ame into the hospital. A few days after her admission she as taken with erysipelas, and died.

Upon examining the diseased joint, bony anchylosis was ound to have taken place between the patella and outer condyle. The inner half of the cartilaginous surface of the inner condyle was ulcerated; the ulceration was shallow, the excavated surface was irregular, and uneven rather than rough. It gave me the idea that it was a surface, which, having been ulcerated in the former attack, had subsequently healed. The capsular synovial membrane was inflamed and thickened, especially at the front of the joint, and a layer of false membrane partially covered both condyles.

Jane Dean, ætat. seventeen, was admitted into the Middlesex Hospital, June 18, 1833. The preceding April, the lower outer and anterior part of the left knee became full and painful, which she attributed to cold from kneeling upon the stones. Cupping, poultices, and a liniment were used. The slight fulness went away, but a pain, which she had felt from the first, deep in the joint, now increased. The application of a blister mitigated the pain for a time; afterwards, cupping twice repeated, leeches, and the use of a cold embrocation, had nearly removed it, when, upon using the joint in walking, the symptoms became aggravated.

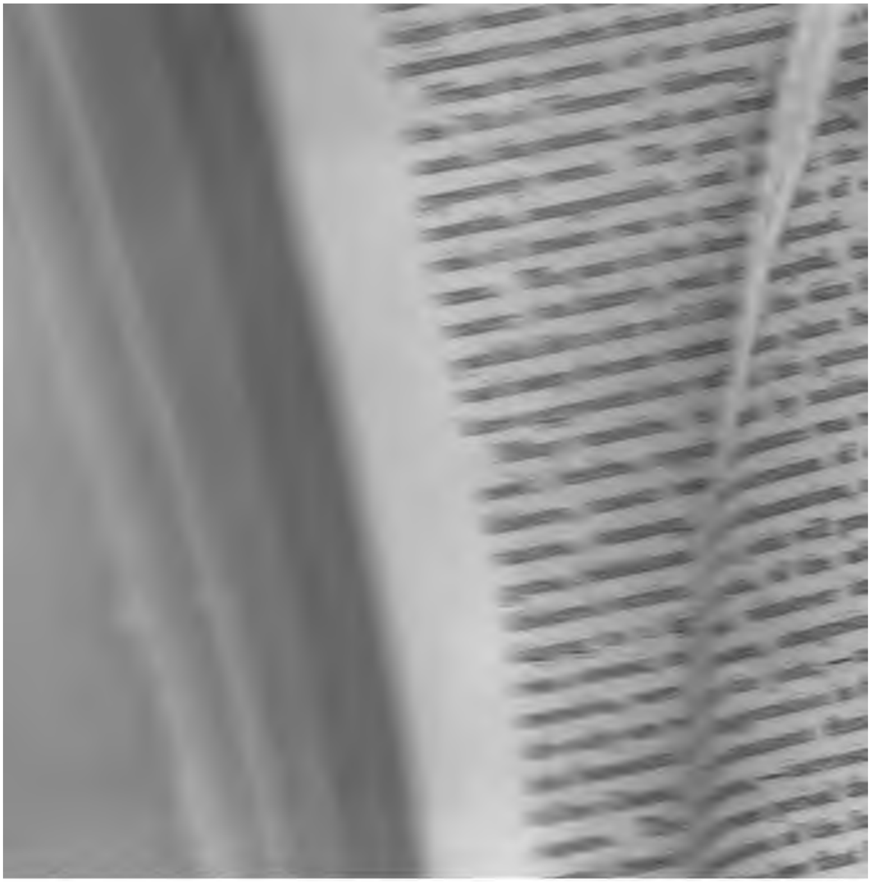
At her admission, but for a slight fulness to the outside

were vessels in the synovial on. Upon the patellar surface of ilage was superficially absorbed ting the characteristic excavation processes. The synovial membrane , which is singular, covering a part face, was highly injected. [g. 42.] cartilages of the joint was otherwise r adhesion to the bone perfect. But they reenish tinge, which presented a remarkable he clear blueish whiteness of the cartilages joint.

ase which has been described, the suffering was er than usually attends so small an extent of ul- disease. I am therefore disposed to think that there ted, combined with the ulcerative disease, the neuralgic ection described under the third head. The patient, however, recovered well from the operation, and has had no neuralgia of the stump. But she has suffered partial paralysis of both arms, produced, as it was evident, by the use of crutches, yet marking, perhaps, a disposition to disease in the nervous system. To this part of the present case I shall revert on a future occasion.

The following case, in which the patient has recovered, bears a great resemblance to the first of the two which have been just narrated.

Elizabeth Higgin, ætat. thirty, was admitted into the Middlesex Hospital in August, 1833. The right knee was a little swollen, but the synovial cavity contained no sensible quantity of fluid; the knee was bent, the tibia retracted, the foot everted. The joint was hot and painful; the pain was seated in the front of the knee; it was much increased by motion: when the patella was moved upon the condyles, roughness was indistinctly felt. The tongue was white, the pulse frequent, the skin dry and heated. The complaint had commenced, ten weeks before, with fever, and pains in the limbs generally, and pain and swelling of the knee: the pain lay on each side of the pa-



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ith the articular cavity. I have [illegible]
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ne tendons of the inner hamstring muscles.
ternal to the capsular membrane of the knee
the cellular tissue.

pected, that some form of articular alteration
g, when, with little or no fluid in the syno-
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lity to pressure or motion of the articular sur-
each other. The conjecture becomes certainty,
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had entirely disappeared [illegible]
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in the winter. When at the
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was for a period better than he had
tack; but at Christmas he again be-
his admission into the hospital, the
lled than ever: the form of the articular
was lost, through effusion of fluid into
hes and fomentation, blisters and caustic
daging over strips of mercurial dressing, were
ually. The limb was amputated on the 12th
The boy speedily recovered.
ining the knee, which had been injected, much
s found effused into it, part half coagulated, part
nized false membrane. The synovial membrane was

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eshy structure, connected to the synovial membrane below he patella by a broad adhesion. This was divided, the umour removed, and the edges of the wound brought together by a suture; and the joint secured by a splint from motion.

"About twenty-two hours after the operation, symptoms f violent inflammation began to show themselves. There was almost insupportable pain; the joint became rapidly wollen; the pulse rose to 90 in a minute, and was hard nd strong. By means of very active antiphlogistic treatment, however, the inflammation subsided, without producing any bad consequences. On the 27th of June he was able to undertake a journey to a considerable distance from London; at which time the knee was neither swollen nor painful, but it was still incapable of perfect flexion and extension.

"On examining more accurately the tumour which had been removed in this case, it was found to be about two inches and a half in length, and one inch and a half in breadth, and somewhat less than half an inch in thickness in the thickest part; convex on one surface, and somewhat flattened on the other. It was of a firm, fleshy structure. The general appearance of it a good deal resembled that of the coagulum which is found in the sac of aneurism: but it was not laminated; it had a smooth membranous surface, and it was manifestly organized, as vessels might be distinctly traced ramifying through its substance."

I have at present under my care a patient, in whom I suppose that a tumour of a similar description has formed upon the inner surface of the head of the tibia immediately below the edge of the cartilage. The patient is rather a nervous female, thirty-six years of age, who three months ago, having previously observed the right knee to snap on moving it, was taken with acute pain at the place of the present tumour. There was no swelling of the knee, nor pain at any other part of the joint. She was desired to apply a blister at that time, which considerably increased the pain.

nd for several days after the operation. The
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When the skin had healed after the blister, she first observed a tumour as big as a large pea, but flatter, on the inner surface of the head of the tibia; it was at first, and continues to be, tender on pressure. The tumour occasions her great inconvenience. She can only walk with comfort, by placing the outer edge of the foot on the ground. If she inadvertently rests upon the sole of the foot, she is seized with sickening pain in the joint, and falls down. The same pain is brought on, when the knee, being bent, is rotated inwards. The tumour is situated immediately before the internal lateral ligament; and every motion which brings the edge of that ligament a little forwarder, causes it to compress the tumour, and pain is produced. This patient derives great comfort from a bandage, which confines the motion of the joint, and prevents the ligament sliding over the tumour.

d. Loose cartilages in joints have exactly the appearance of the texture from which their name is taken. Sometimes there is one only, in other cases there are several. They grow upon the attached surface of the synovial membrane, and principally upon that part of the membrane which is reflected over the bone. They are covered by synovial membrane, and for some time continue adherent by a pedicle formed of it. The texture of these growths is occasionally bony. They become detached through the accidental rupture of the slender pedicle, which joined them to the surface on which they grew.

When detached, they are a source of perpetual trouble and anxiety to the patient, since they are liable at any time to get interposed between the articular surfaces, in which situation they produce severe and sudden pain, so as to throw the patient down at the time, and afterwards to bring on synovial inflammation.

" My own experience," says Sir Benjamin Brodie, " is much in favour of the removal of these loose cartilages by an incision of the joint, provided that this be done in a cautious and prudent manner. The patient should be kept in a state of the most perfect quietude for two or three days preceding, and for several days after the operation. The cartilage having been well fixed, the [illegible] should be slowly and separately divided [illegible] The wound of the synovial membrane [illegible] means of a probe-pointed bistoury [illegible] of the cartilage [illegible] and the [illegible] edges [illegible] brought in contact with each other [illegible]

[illegible]

dyle and the capsular membrane, its nature can be determined with tolerable certainty by its greater or less hardness.

SECTION III.

Diseases of Bursæ mucosæ.

Bursæ mucosæ are small sacs of synovial membrane, which are interposed as joints either between the periosteum and the skin, or between the periosteum and either muscles or tendons, or between tendon and tendon.

1. The subcutaneous bursæ are either natural, like those upon the patella or the olecranon, or are developed in the common cellular membrane by pressure.

The subcutaneous bursæ are met with in various states of disease, all of which depend upon different degrees of inflammatory action.

The bursa of the patella is sometimes distended with synovia, without pain, or tenderness, or thickening of the membrane. Rubefacient applications are sufficient in most of these cases to produce absorption of the fluid. If they fail, the bursa should be punctured, the synovia let out, and the wound healed: the operation should be repeated, if, or as often as, the fluid reaccumulates.

Increased secretion of synovia in a bursa is liable to be combined with considerable thickening of the membrane. In this case, likewise, puncturing the sac is available; but the fluid is more certain to reaccumulate afterwards; so that if the tumour is small, it answers better to remove it,—any accidental attack, or increase, of pain and tenderness having been first subdued by proper treatment.

If the thickened bursa is of considerable size (as large as a small orange for example), it still may be removed. The alternative is to puncture it; when suppuration will probably follow. A middle-aged woman was admitted into the Middlesex Hospital with a large bursal tumour in front of the knee. Upon puncturing it, eight ounces of a dark-brown turbid liquid escaped. The cyst then inflamed and suppurated, not without considerable pain. Therefore, although the first puncture had not closed, I made three other openings at different corners of the synovial sac, which gave freedom to the discharge; the inflammation speedily subsided, and the patient recovered. There is never occasion to lay an enlarged bursa extensively open, or to pass a seton through it, or to apply caustic: if the fluid will not disperse by common means, it is only necessary to puncture the sac several times, when it will either cease to secrete an undue quantity of fluid, or suppurate, and so get well.

Acute inflammation of the bursa of the patella is not unfrequent, when the sac becomes an abscess. Upon puncturing it, the inflammation subsides, and the complaint is cured. If the puncturing is delayed, the inflammation and suppuration spread, so as to form a large abscess in front of the knee, the walls of which are partly cellular membrane, partly the synovial sac.

These suppurations, external to the joint, are liable to be mistaken by a superficial observer for collections of fluid in the articular cavity.

Pressure will cause the development of subcutaneous bursæ in the cellular membrane, where they previously had no existence. I have removed a small bursa with a thick cyst from the posterior annular ligament of the wrist, and another from the lower and outer part of the knee joint, points where naturally there are no bursæ. After the excision of the bursa of the patella, the skin and cicatrix are fixed for a time to the bone; afterwards they become again moveable.

2. The bursa situated between the latissimus dorsi and the inferior angle of the scapula is liable to become distended with a very considerable quantity of fluid. In this state it should be punctured, and the puncture healed, if possible: the fluid is to be again let out, on its reaccumulating. But the bursa, if greatly enlarged, is more likely, upon being opened, to suppurate. In the latter case, after discharging for some weeks, it will probably dry up, and the case terminate favourably.

3. The sheaths of the tendons are liable to the same affections as the subcutaneous bursæ. The most frequent place of their enlargement is at the wrist, in the hand and fingers, and at the ankle.

CHAPTER III.

VOLUNTARY MUSCLES AND THEIR TENDONS.

SECTION I.

The Voluntary Muscles.

The study of the voluntary muscles in health comprehends two different inquiries; the first relating to the structure of muscular tissue, and to the endowments which it possesses independently of the brain and spinal cord; the second relating to phenomena which are produced by influences originating in those organs. The same distinction may be made with advantage in the pathological study of the voluntary muscles. Their powers of self-restoration after injuries, their liability to hypertrophy, atrophy, inflammation, and malignant disease, had better be considered apart from the phenomena of palsy and anæsthesia, muscular neuralgia and spasm.

1. *Injury and Reparation.* — In injuries of muscles, the same distinction is to be drawn as in injuries of bone. Muscular tissue may be torn without, or with, an open wound. The process of reparation is different for these two cases. In the former case, the torn fibres are united by a sort of callus, which is formed through the infiltration of the cellular membrane with lymph. In the latter case, the divided or lacerated muscle inflames and granulates, the granulations forming a means of union equivalent to the infiltration of the cellular membrane in simple muscular rupture. The uniting medium subsequently contracts in volume by a process of modelling growth, and is finally either converted into muscular tissue, or absorbed, leaving the muscle perfectly restored.

The muscles are interested in surgical operations.

In operations for tying arteries, or for the removal of tumours, or in any other case in which the bottom of a wound is not intended or likely to close by adhesion, it is generally preferable to *divide* any portion of muscle which intervenes between the incision of the skin and the bottom of the wound. If the edge of the muscle is *drawn aside* only, in the first place it may still embarrass the operator; in the second place, after the operation, it has a tendency to prevent the free escape of matter from the interior of the wound, and to retard the process of healing. The promptness and completeness with which a divided muscle unites, renders the above rule entirely unobjectionable.

If a muscle has to be divided in an operation in order to reach a part below it, it is better upon the same reasoning to divide it transversely, than to make a longitudinal section, or one parallel to its fibres.

In dividing parts in an amputation, to secure a fleshy stump, a certain proportion must be kept between the quantity of integument and muscle left, and the length of bone. But at the time of an amputation, a limb may be in one of two different states; it may be either in full muscular strength, or it may be wasted and extenuated. A different calculation is required for the two cases. For in the first, the muscles retract very little on division; while in the second, they retract to an extraordinary degree. The reverse holds with the integument. In a strong and large limb, over which the integuments are already stretched to the utmost, they fly back to a remarkable extent upon division. In an extenuated limb, in which it has already shrunk to the utmost, the skin hardly retracts at all.

The clean oblique sections of the flesh produced by flap operations unite more readily, or to a greater extent by adhesion, than the separately divided skin and muscle in the circular operation.

To promote union by adhesion of the muscular substance in a stump, it is better, as it has been recommended by Mr. Hodgson of Birmingham, not to close the wound directly, but to leave the cut surfaces of the muscles exposed for twenty minutes or half an hour, when their surface is seen to be glazed with an exudation of lymph: they should then be gently laid together, adhesive plaister applied, and the wound lightly dressed.

2. *Hypertrophy.* — The voluntary muscles are rarely affected with hypertrophy. I have seen, however, one instance, in which the tongue was so affected; and the following is the account of a similar case, treated by Mr. Hodgson for the same disease successfully by ligature. I transcribe it in the words of my pupil, Mr. William Turleton, who communicated it to me.

"A child, when about two months old, was first observed to project its tongue beyond the gums, and to sleep with the mouth open. After a time, the mother became alarmed by a very sensible increase of the size of the tongue, and applied for advice to many medical men. Its tongue [now at four months] was at least as large again as natural, and always protruded. The child took the breast with difficulty; but it grew, and looked in health.

"The growth of the tongue still advanced with disproportionate rapidity. When eighteen months old [July 1832], the tongue was very large and thick, projecting more than an inch and a half beyond the teeth, and served to widen the mouth considerably. The incisor teeth had formed a deep furrow upon the upper and under surface of the tongue, but ulceration had not taken place. The protruded surface of the tongue, from being constantly exposed, was covered with a coat of dried mucus. There was no appearance of diseased structure in the part. The child was weaned, and fed as other children of the same age (with spoon meat). She was always pleased with animal food, and experienced no difficulty in tearing it to pieces with the upper teeth pressing upon the tongue. There was no pain in the part. About three months since, leeches had been applied without advantage.

"April 20, 1833.—The child's health is good. Since the first part of these notes was taken, the tongue has grown in proportion with the rest of the body. The protruded part of the tongue is the size of a small orange. Mr. Hodgson determined upon removing it. Accordingly, the tongue being drawn out of the mouth as much as possible, a needle with a double ligature was passed through the frænum, just behind the part of the tongue where the teeth pressed upon it. The ligatures were carried out on each side of the tongue, as far [illegible] as possible, and tied very tight. There was very little blood lost, and the child did not appear to suffer much pain from the operation. In a short time after the operation, the tongue became cold; but on the following day (21st) the tongue became rather warm; and when Mr. Hodgson scratched it with his nail, it bled. He then tightened the ligatures; again, in a short time, the tongue became cold; but on the following day (22d) slight warmth returned, and Mr. Hodgson once more tightened the ligatures. The tongue became cold, and in places black; and remained so until the following day, when Mr. Hodgson removed it with a pair of scissors.

"June 1833.—The child is in good health, the tongue is quite within the mouth, the incisor teeth are gaining their proper position. They were pushed forwards by the tongue.

"May 1835.—The child is in good health, has learned to talk, and can articulate very well."

3. Atrophy of the voluntary muscles presents itself under several forms.

a. In simple atrophy, the muscles become small, shrunken, flaccid, pale, and devoid of irritability. Such is the appearance common to limbs that have wasted from long disuse, in joint disease, or in ordinary palsy, or through palsy from lead.

b. Another form would admit of being termed rigid atrophy. In this case the proper muscular structure wastes, and the tissue which remains is tense and hard and inextensible. The common seat of this affection is the sterno-cleido-mastoid muscle; the distortion which it produces is termed the wry neck. But obliquity of the neck may be produced by the same disease in other muscles; it may likewise, when it has existed for many years, prove to have been merely spasmodic, and spontaneously go away.

Dr. Mott mentioned to me, that he had seen three cases of rigid atrophy in the muscles which raise the lower jaw the effect of the change of structure had been gradually to fix the mouth in the closed position. He had succeeded however, by means of a suitable instrument, in forcing the jaws gradually to unclose.

c. There is another form of atrophy, in which a rapid and total absorption of the muscular structure takes place. The attack has an acute character, and is attended with great pain, which looks like inflammation: yet it certainly is not inflammation of the muscle, though it possibly may be accompanied by, or even result from, inflammation of the membranes of the muscular nerve. The disease is brought on by long exposure to cold. I have witnessed the two following cases.

Thomas Styles, aged twenty-seven, a carver and gilder, four years ago, when heated with exercise, and in perspiration, was obliged in his business to keep the right hand in water for an hour; to which he attributed what shortly followed. He was attacked with pains in the arm, which were considered rheumatic; and the arm was rubbed with stimulating applications, and kept warm in flannel. Weakness of the arm however, and wasting, ensued. The arm and hand gradually became tremulous, and have continued so. He cannot raise his hand to his head, nor extend the arm horizontally, nor supinate the wrist: he has, however, the use of his hand, and can write. The muscles of the arm and forearm generally are extenuated; but the latissimus dorsi and serratus magnus are completely gone.

John Jeremy, aged forty-five, a farmer's workman, accustomed to frequent exposure to wet and to let his clothes dry upon him, four months ago was seized with pain in the left shoulder, which lasted, almost without intermission, for six weeks: it was most severe a fortnight after its commencement: it was at times as violent, he said, as if his arm was coming off. There was no swelling or redness, no numbness, no general tenderness on pressing the shoulder, but great pain was felt on lifting the arm by means of the other hand. The arm he could not lift by its own efforts. About a week from the beginning of the illness, he observed that the shoulder had lessened: the extenuation continued progressive after the pain had ceased; and now the deltoid, supra and infra spinati, and the teres, appear to have been wholly absorbed, or reduced to thin layers of membrane. The shoulder is free from pain, the joint undiseased, but he has no power to lift the arm: the forearm and hand are not wasted. Pressure on that part of the deltoid which covers the circumflex nerve is now attended with pain; and at the height of the attack, when the suffering was the greatest, used to aggravate it.

4. Steatoma.—The muscles are liable to fatty degeneration. In this affection they sometimes, but not always, diminish in volume. The altered muscle is sometimes the seat of severe pain, which has led to amputation of the limb. Vicq d'Azyr, in an old subject, saw the psoas and iliacus, the glutæus medius and minimus, the adductors, the deep posterior muscles of the leg, and the plantar muscles, completely changed into fibro-cellular fat, without traces of remaining muscular fibre. The fat, into which these muscles were changed, is described as white, firm, and contained in numerous minute cells; the uniting cellular tissue, whitish, looser, and more separable than usual: the fat is not deposited between its filaments, but forms part of their substance. Examined by a good glass, it presents a mass of soft transparent fibres of various diameters in different parts of their length*.

5. *Ossification of muscle* has been already adverted to under the head of Exostosis.

6. *Inflammation* of the voluntary muscles may be acute or chronic, circumscribed or diffused; or it may be rheumatic or gouty.

In acute inflammation the muscular tissue softens, and suppuration or gangrene follow. Inflammatory softening and suppuration of the tissue of several muscles is liable to occur in puerperal fever.

When affected with chronic inflammation, entire muscles sometimes disappear in abscesses. In psoas abscess, the membranous sheath of the psoas has been the only trace of the muscle remaining.

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* Craigie's Elements of General and Pathological Anatomy, p. 500.

In rheumatic inflammation of muscles, increased vascularity of the muscular texture has been found, and a deposit of gelatinous fluid among the fasciculi.

The gouty deposit is found between the fibres of voluntary muscles.

7. Every variety of malignant growth, with the exception of osteo-sarcoma, is found to implicate the muscles.

8. *Entozoa.*—The *cysticercus cellulosæ* is found in the voluntary muscles.

The *trichina spiralis*, recently described by Mr. Owen, is an entozoon which appears to infest the voluntary muscles exclusively. The flesh of bodies beset by trichinæ spirales appears studded with minute whitish specks, which are of an elliptical figure, one-fiftieth of an inch by one hundredth, and contain a minute coiled-up worm. A few of the cysts contain two worms. The cysts are supposed to be cellular membrane condensed around the entozoon. The worm is disposed in two to two and a half spiral coils. When straightened, it measures from one-twenty-fifth to one-thirtieth of an inch in length, and from one-seven-hundredth to one-eight-hundredth of an inch in diameter. It is round and filiform, terminating obtusely at both extremities, which are of unequal sizes, and tapering towards one end for about a fifth part of its length. At the larger extremity, Mr. Owen observed a large, transverse, linear orifice or mouth.

The two patients, in the bodies of which these entozoa were identified, died in St. Bartholomew's Hospital, "after long and debilitating illness, producing great emaciation; unaccompanied, however, with any eruption on the skin, or any greater loss of muscular power than would probably have arisen from the diseases of which they died."

Mr. Wormald mentioned to me, that the trichinæ were found in the sphincter externus ani, but not in the muscular fibres of the rectum. They were, however, found in the fibres, which that excellent anatomist, the late Mr. Wilson, described, under the name of compressor urethræ — a circumstance which strongly corroborates his opinion, that these fibres are muscular, and constitute a voluntary muscle.

SECTION II.

Of the Tendons.

Tendons, when divided, readily unite: the surrounding cellular membrane is thickened by an infiltration of coagulable lymph, which forms a bed that contains and adheres to the divided ends. This bed of thickened membrane changes itself into a callus, which gradually coheres inseparably with the ends of the tendon; and acquiring strength and firmness, after a time shrinks to the size of the neighbouring tendon, and assumes its white colour and fibrous character.

It is probable that tendon is susceptible of simple, and of rheumatic, and of gouty inflammation. The tendons are liable to become ossified.

Small painful swellings are liable to form upon the tendons. A gentleman, thirty-two years of age, after taking more exercise than usual, observed a swelling of the size of half a bean on the inner and anterior surface of the tendo Achillis, which occasionally caused pain in walking. Half a year afterwards, a similar swelling formed in the other tendo Achillis at the same place: the tumours were situated about two inches above the os calcis. He applied a solution of the deutochloride of mercury in alcohol, which produced soreness of the skin, without making at the time any sensible impression upon the swellings; and then he thought no more about them. They still continue, but are something less in size; and although sensible, so as to be rather painful if pressed, they are otherwise without sensation.

CHAPTER IV.

CELLULAR TISSUE: FASCIÆ: ADIPOSE TISSUE.

SECTION I.

Cellular Tissue.

THE cellular tissue owes its importance in pathology to its mechanical properties. It is made of elastic threads and laminæ, which form a net-work that covers the flesh of the body, and dips into all its interstices, the intervals of the network being one continuous series of cells lubricated by serum, which extend through the whole frame.

The simplest alterations of this tissue are its infiltration with fluids, either unusual in quantity or in kind.

1. *Emphysema.*—The cellular tissue may be distended with air, which causes a uniform swelling, crepitating or emitting a crackling sound when pressed. The situations, in which this swelling may begin, vary with the cause by which it is produced. It may take place spontaneously, when it is commonly general, and is supposed to be a product of secretion. It may arise from rupture or laceration of the mucous membrane of the larynx or windpipe, when the swelling appears chiefly over the face, neck, and upper part of the chest. It may succeed a broken rib, or any injury of the lungs, when it appears sometimes over the neck, face, and chest; sometimes over the chest and side only. It may arise from rupture of the bronchial membrane during violent efforts; and in this manner emphysema happens in puerperal women. Lastly, it may appear as an

effect of gangrenous inflammation and mortification, when it is confined solely to the affected limb. In the latter case, air is produced by the decomposition of the serum of the blood in the morbid parts. In examining the body of a person who died after injury of the lungs, with emphysema, on dissecting back the integuments and adipose tissue of the chest and abdomen, the cellular membrane appeared like bubbles upon the muscles, from which, when pressed, the air partly passed on into the adjacent cells, partly escaped.

2. *Serous Infiltration, Œdema, Anasarca.*—Under the operation of various causes, of which the commonest is delay of the circulation from disease of the valves of the heart, the quantity of serous fluid in the cellular tissue may be considerably increased; and this increase gives rise to a pale, white, or wan-coloured and cold swelling of the skin, which is distinguished by receiving the impression of the finger, or of any other substance forcibly applied. When this swelling arises from a cause of such general influence as obstruction in the heart, the effect is necessarily general likewise; but from the free communication of the cells of the tissue, the fluid gravitates to the lower part of the person.

3. There are occasions on which the fluid with which the cellular tissue is infiltrated is not simple serum, but has an acrid and stimulating quality. This is observed in the fluids of the cellular membrane adjoining a part bitten by a venomous serpent; or in the swelling which, in unwholesome constitutions, follows a severe injury, such as a compound fracture; or in phlegmonous erysipelas.

There is nothing more formidable in surgery than the second case to which I have adverted. An instance is now before me. A labourer, of a full, gross habit, yesterday morning early, was thrown down by a waggon, the wheel of which passed over his knee, causing a compound fracture of the inner condyle of the femur, and opening the knee-joint. He refused to have the limb amputated. At this time thirty hours after the accident, the thigh, nearly to the hip is swollen to double its natural size, the veins full, and th skin mottled with large patches of red: the ordinary hue of the skin which attends this form of swelling, when its progress is something less rapid, is a pale coppery tint.

In the third case, or whenever the cellular membrane is filling with fluid, and the skin is tense and inflamed over it, incisions are useful. The most striking instance of their efficacy which I recollect is the following. A medical student, then an assistant at the Marylebone Infirmary, had poisoned a wound on his finger in examining a body. The worst form of symptoms supervened: he was attacked with shivering, with fever of a low character, and nervous irritability: there was no affection of the lymphatic system, but some tumefaction of the arm, and a large swelling upon one side of the body. The patient's breathing was oppressed; the cellular membrane on the side was swollen, without fluctuation; the skin was hard, brawny, and of a dark red colour. I therefore made an incision through the skin and the thickened subjacent membrane; some serum and about six ounces of blood escaped; the tension of the side was lessened, and the patient mechanically relieved. From that period he improved, and finally recovered; but such had been the diffusion of acrid humour through the cellular tissue, that abscesses formed not only in the shoulder and on the side which had been opened, but below the pectoral muscle and the integuments of almost the whole back.

4. The cellular tissue in phlegmonous erysipelas constitutes a medium along which an acrid humour rapidly finds its way, the presence of which contributes to excite suppuration and sloughing. The cellular membrane is no less the ordinary seat of common phlegmon. Phlegmonous or circumscribed inflammations often occur immediately below the integuments of the arm and of the thigh. The same often form in the nates, and about the anus. A common boil is a small phlegmon, with a central slough of cellular membrane,—a carbuncle, a large and virulent boil.

5. Chronic abscesses have their seat in the cellular membrane, both below the skin and in the intermuscular and interfascicular spaces, the muscular fibre being absorbed to make room for the enlarging abscess. Such abscesses form-

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6. The cellular tissue, when divided, readily unites. I have already adverted to its efficiency in uniting other parts. In the restoration of a broken bone, a divided fibro-cartilage, a ruptured ligament, a divided tendon, muscle, or nerve, it is the surrounding cellular tissue, which, becoming infiltrated with lymph, forms the firm glue-like [illegible], in which the divided parts are contained, and the process of organized reparation commenced.

7. All the morbid deposits, but [illegible], are met with in the cellular tissue.

8. The filamentous tissue is a frequent seat of encysted tumours. These are membranous sacs, which contain a substance either like honey in colour and consistence, or like tallow: in the former case they are termed meliceris, in the latter *steatomatous*. These tumours are moveable, tense, elastic, and disposed to indefinite increase: and the sooner they are removed the better. It is convenient in their removal, first to open them, and to squeeze out their contents, when the cyst may easily be dissected out. Its en-

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SECTION [illegible]

Of Ap[illegible] and F[illegible]

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Aponeuroses are liable to a simple and [illegible] inflammation.

The first is the most frequent [illegible] ordinary bleeding. The [illegible] arm adjacent to the elbow are swollen and painful [illegible] skin has a slight blush upon it. Rest, [illegible] fomenting, and a raised position of the [illegible] relieve the inflammation.

tire removal is necessary, as any part of it will serve to reproduce the tumour.

9. Another growth, and which is perhaps confined to the cellular tissue, may be termed fibro-albuminous tumour. It sometimes occurs in the cellular tissue of the breast, and grows to a considerable size, having much of the external character of malignant disease. In the following instance, this growth occurred in the cellular tissue of the parietes of the abdomen.

William Latham, ætat. forty-seven, was admitted into the Middlesex Hospital, in July 1835, with a tumour upon the umbilical and left iliac region. It is twenty years since he first noticed a small lump below the skin, of the size of a pea, which gradually enlarged, but was not painful. Six months ago, it was as large as a small egg; and a surgeon, whom he consulted, tried to break it by pressure. The skin then gave way, when the swelling enlarged rapidly; at the time of his admission, the swelling looked a great fungoïd tumour, five inches in diameter, an inch and a half in thickness, and adhering by an oval pedicle three inches in its long diameter. The surface of the tumour was lobulated, and covered with large flat granulations, of a pale red colour, which secreted matter. The tumour had bled frequently and profusely, not from the whole surface, but from two or three points. Since it had been broken, the patient had frequently experienced shooting pains in it, which lasted two or three minutes. He was greatly reduced by the bleedings and the discharge. The skin round the pedicle of the tumour was mottled of a dark red, and several tortuous and swollen veins extended from it in different directions. The inguinal glands were not enlarged.

I removed this tumour on the 23d of July. It was situated upon the external oblique muscle and its tendon, from which I dissected it: two vessels only required to be tied. The wound granulated healthily; and a few days made a remarkable improvement in the patient's appearance and strength, who is now [August 10] all but recovered.

On examining the tumour, it was found to consist of two distinct masses; one of the size of a walnut, seemingly of later formation, contained in a clean membranous capsule, firm, of no great vascularity, grey, semi-transparent, elastic, easily breaking down with pressure. The other, which had formed the more prominent and larger mass, was of much greater size: its base was covered by integument, the giving way of which, six months before, had allowed of or given rise to its rapid increase, and exposed it as a vascular and secreting surface. In one part of the larger mass, and inclosed in it, there was a second growth, opaquer in colour, and more fibrous in character, not unlike, though less firm than, the ordinary fibro-cartilaginous tumour of the uterus. [*k.* 6.]

I assisted Mr. Broughton in removing a large tumour from the thigh of a female, which had very much the character of the smaller and more fibrous portion of the tumour described above. But it was of a more gristly texture, or more closely approximated to the fleshy tumour of the uterus. It appeared to have formed in the intermuscular cellular tissue. [*k.* 7.]

SECTION II.

Of Aponeuroses and Fasciæ.

The principal part which these textures play in disease is mechanical. They are tense, strong, and unyielding; and they bind the flesh of the limbs. But what is salutary support in the healthy condition of a limb, is liable to produce painful and mischievous tension and confinement in disease.

Aponeuroses are liable to simple and to specific inflammation.

The first is the most frequent untoward consequence of ordinary bleeding. The wound festers; the arm and fore-arm adjacent to the elbow are swollen and painful, and the skin has a slight blush upon it. Rest, cooling medicines, fomenting, and a raised position of the limb, in a few days relieve the inflammation.

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[illegible] the Middlesex Hospital [illegible] with the calf of [illegible] dark red, with a [illegible] some thin pus [illegible] had been kicked by [illegible] attributed the [illegible] the swelling [illegible] however, was [illegible] being introduced passed below the gastrocnemii: the external wound was enlarged a little; the abscess got well. But at the same time this patient showed me a swelling on the back of the fore-arm, as large as, and much of the figure of, two small walnuts: it had been a year forming, and lately had become painful: it adhered to the periosteum covering the posterior edge of the ulna, and to the aponeurosis. My attention was now drawn to the general health of the patient, and I found that he had had for many months a scaly eruption upon the skin; and he said that a year before, a tumour like the present, only less, had formed at the corresponding part of the other arm. I gave him upon this the decoction of sarsaparilla, with the oxymuriate of mercury: his health began to improve, and the scaly eruption to die away; but the lump below the elbow increased in size. I therefore punctured it with a lancet in three places where it was most elastic; it bled freely, and at one part small fragments of lymph escaped with the blood. The swelling was poulticed, and is now beginning to suppurate, and lessens daily.

6. The cellular tissue, when divided, readily unites. I have already adverted to its efficiency in uniting other parts. In the restoration of a broken bone, a divided fibro-cartilage, a ruptured ligament, a divided tendon, muscle, or nerve, it is the surrounding cellular tissue, which, becoming infiltrated with lymph, forms the firm glue-like capsule, in which the divided parts are contained, and the process of organized reparation commenced.

7. All the morbid deposits, but osteo-sarcoma, are met with in the cellular tissue.

8. The filamentous tissue is a frequent seat of encysted tumours. These are membranous sacs, which contain a substance either like honey in colour and consistence, or like tallow: in the former case they are termed *meliceris*, in the latter *steatomatous*. These tumours are moveable, tense, elastic, and disposed to indefinite increase; and the sooner they are removed the better. It is convenient in their removal, first to open them, and to squeeze out their contents, when the cyst may easily be dissected out. Its en-

The aponeuroses are a principal seat of rheumatic inflammation.

They are likewise occasionally affected with lues. I have seen, in connection with syphilitic periosteal inflammation and suppuration on the tibia, inflammations with suppuration on the aponeuroses of the arm and leg, bearing a close affinity to the periosteal nodes.

SECTION III.

Of the Adipose Tissue.

The most remarkable circumstance with which I am acquainted respecting this texture, is its increase in animals after the removal of the spleen. This increase begins in dogs as soon as the wound has healed. I have twice repeated this experiment. The duration of the obesity is temporary: before a year is passed, the animal returns to its former weight and degree of spareness.

The adipose tissue readily unites when divided; and if the wound heal by granulation, presents, in the process of restoration, granulations as florid as, and at first of rapider growth than, those of the adjacent muscle.

The adipose tissue is liable to general or partial hypertrophy.

Common fatty tumours result from partial hypertrophy of this texture. They require to be removed by an operation; which occupies very little time, and is easily performed, if the surgeon lays open the sac of cellular membrane that immediately contains the tumour. Adipose tumours consist of large lobulated masses of coarse membrane and fat. They grow to a considerable size. The largest which I have removed weighed thirteen pounds two ounces. [*h.* 30.]

Continued pressure on an adipose tumour will sometimes cause the absorption of the oil, and convert it into a dense membranous sarcoma.

In hypertrophy of the breast, the principal source of the enlargement is increase of the adipose tissue.

The following case, communicated to me by Mr. Samwell, exemplifies a peculiar affection of the subcutaneous adipose tissue.

A female, ætat. thirty-six, after suffering from rheumaism, had a swelling of one instep, which, however, went away; but shortly after, the leg began to enlarge, and became painful. The increase in size was very gradual; but in four years the leg had become twice as large as natural. The swelling was diffused over the whole leg, but was greatest upon its outer aspect: to the touch it felt elastic, like Indian rubber. The skin was not discoloured. Mr. Samwell punctured the swelling, when a thick, semiluid substance, like grumous blood, escaped; upon which he enlarged the puncture to a long incision, and squeezed out more of a similar nature. The wound healed readily. But the swelling, at the side where it had been opened, filled again, and the skin began to ulcerate. The limb was then amputated above the knee; the patient recovered, and has been four years well.

Upon examining the swelling, it was found to be exterior to the fascia, and situated in the adipose tissue; which, where the enlargement was greatest, was three inches in thickness, soft, grumous, and red. At the extremities of the swelling, the adipose tissue seemed infiltrated with a gelatinous substance only. Intermediately, there was a transition in colour between the pale gelatinous swelling of the adipose tissue near the knee and ankle, and the sanguinolent and grumous effusion in the middle of the tumour. No other tissue appeared to be diseased. Mr. Samwell has an excellent model of the recent appearance of the parts, and has given to King's College a specimen [*h*. 32.] of the disease. The gelatinous infiltration extended above the knee o the parts divided in the amputation.

The malignant growths invade the adipose tissue; espeially scirrhus, the spread of which often gives a gristly character to the fat about a carcinomatous mamma, or uterus, or rectum.

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[illegible] by the one they minister [illegible] other they regulate nutrition, se- [illegible]. In their first [illegible] channels of communication, [illegible] in their second, they not only [illegible] are capable of originating or deter- [illegible] in addition to the im- [illegible] the brain and spinal cord.

SECTION I

The Nerves as Organs of Consciousness.

[illegible] Physiology has established, that, in reference to [illegible] the nerves are of two classes; the one sen- [illegible] other voluntary. This distinction is constant, [illegible] which has been proved to exist.

[illegible] sentient and voluntary nerves distributed to any seg- [illegible] the frame are sometimes separate through their [illegible] as, for example, the facial branches of the fifth [illegible] cerebral nerves: more generally they are bound [illegible] sheath, as is the case with the sentient and vo- [illegible] fasciculi of the spinal nerves, of the pneumogas- [illegible] the glosso-pharyngeal.

The sentient nerves are the first, second, ganglionic por- [illegible] the fifth, soft portion of the seventh, certain fasciculi

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reference to consciousness, are channels
r communication only to and from the cen-
he nervous system, two consequences follow
One is, that division, or in general any con-
chanical or chemical alteration of the texture
suppresses its function beyond the point of in-
The other is, that the proper disorders of nerves are
less numerous than might at first be imagined; so
y of the phenomena of disordered sensation and muscu-
motion depending, not primarily upon the nerves, but
pon affections of the central organs, in conveying the in-
fluence of which the nerves are passive agents.

The effects which result from disturbance, whether direct or indirect, of the animal functions of the nerves, have the characters either of *depression* or of *excitement*.

Muscular weakness, and palsy or paralysis, numbness, and entire loss of sensation or anæsthesia, are the degrees in the first class of affections. Increased sensibility and pain, spasm, or uncontrollable muscular action, — whether tonic or sustained, as in locked jaw, — or clonic or intermitting, as in repeated convulsions, belong to the second head.

The pathological phenomena displayed by the nerves may be arranged under the following heads: — Injury and reparation, increased vascularity, inflammation, and ulceration, hypertrophy and atrophy, tumours, neuralgia and spasm from irritation.

I. Injuries of nerves present different features, according to the nature of the violence done. The consequences of simple division of nerves, of the section of nerves in amputations, of ligatures on nerves, of the laceration of nerves in [illegible] [illegible] [illegible] [illegible] nerves, require to be studied [illegible].

When a nerve is simply divided, or a small portion [illegible], [illegible] [illegible] [illegible] takes place in a [illegible] [illegible]. This has been shewn by the experiments of Dr. [illegible] and Mr. [illegible] on the [illegible]gastric, [illegible] in the Philosophical Transactions: by experiments of my own on the [illegible] of the fifth and seventh, [illegible] in the Medical and Physical Journal: and, finally, by some very [illegible] experiments on the spinal nerves, [illegible] by Mr. Swan in his valuable work on the Disorders of Nerves.

I found that a divided nerve unites like a divided tendon. The adjacent cellular tissue becomes [illegible] with lymph, which forms a sort of callus that includes and unites the divided ends. After some time this callus appears like a [illegible] [illegible] [illegible] the [illegible] nerve. I found that sensation [illegible] more quickly than voluntary motion, sensibility beginning to appear early in the third week: while motion did not recommence till after the fourth.

The facts which Mr. Swan has added to those which were [illegible] known, are the following:—

1. In twenty-four hours after division, the extremity of a [illegible] [illegible] [illegible] enlarged and more vascular.

2. In four months after the division of a nerve [in a rabbit] the union is sufficiently perfect for considerable return of voluntary motion.

The sciatic nerve of the right leg of a rabbit was divided [illegible] [illegible], and the animal was killed November 22d. On the [illegible] of September it could make much use of its leg. From this time it kept gradually improving; and, before it was killed, it had nearly the perfect use of the limb.

3. The function of a voluntary nerve may be restored, after it has been divided by a ligature.

The sciatic nerve of a rabbit was tied with a ligature of thread on the 7th of August. The ligature came away on the [illegible]. The animal was killed on the 22d of November. The nerve was completely united. The portion of the nerve above the part where the ligature had been applied was nlarged: below this, the nerve was smaller. The skin bout the os calcis was ulcerated, and part of that bone was lead; but the animal had improved in the use of the limb, hough it was by no means perfect."

4. The formation of new nerves, after excision of part of he trunk of a nerve, appears to be to a certain degree ossible.

Half an inch of the sciatic nerve of a rabbit was cut out n the 16th of July, and the animal was killed on the 22d f November.

The extremities of the divided portions were separated rom each other eight-twelfths of an inch. There appeared everal small branches arising from the superior portion: ut there were three very remarkable; one was continued own into the nerve, passing to the outside of the heel, hich in this case was larger than ordinary: the other two ppeared to be newly-formed nerves; one went from the uperior portion to the popliteal nerve, the other went from he same place to the fibular nerve. The integuments of he heel were in an ulcerated state, and part of the os calcis as dead; but these diseased appearances had not increased n the last two months. The rabbit was certainly much mproved in the use of its limb, which was, however, very far from being perfect.

5. The restoration of nerves, after complete or partial division, is in general accomplished as perfectly in animals as in human beings; the reunited nerve slowly resumes its functions.

For example; — In a case mentioned by Mr. Swan, "in which the nerves of the thumb were divided, sensation kept gradually returning; but though it is now nearly a year since the accident, it is not quite perfect. In a case of tumour of the median nerve, Sir Astley Cooper removed two-thirds of the thickness of the nerve, leaving one-third: tingling of the fingers with some partial numbness followed, but no constitutional irritation; and the patient did very well." But the progress of all cases is not equally favourable.

In a small proportion of instances, no restoration whatever takes place. A patient consulted me, in whom, three years wound. The median nerve had been divided above the wrist: the wound had healed readily, but the part of the hand supplied by the nerve remained without feeling or voluntary power. The cause of the non-return of nervous power in such cases is explained by what happened in the following experiment. I divided the pneumogastric nerve in the neck of a dog: the animal recovered. A month afterwards, I divided the nerve of the other side: the animal died. Upon examining the state of the nerve which had been first divided, I found that no union had taken place: the cerebral portion of the divided nerve terminated in a thick white bulb that had no union with the lower portion, which was wasted and diminished in size, and semitransparent.

In a large proportion of the unfavourable cases, a more or less perfect union takes place; but it is attended with a train of symptoms of various degrees of severity, but partaking of one character. These symptoms are, pain extending along the injured nerve, which is described as aching, gnawing, thrilling,—muscular weakness of the limb,—cramp and other spasms of the muscles,—fits of [illegible] insensibility.

It is of importance in a practical view of these cases, to distinguish between those in which the symptoms supervene within a few hours of the injury, and those in which they manifest themselves after cicatrization of the wound.

In the former case it is presumable, that the symptoms result from the manner in which the nerve is injured, which may possibly have been lacerated, or its fibres left partially upon the stretch through an incomplete division: the practice which must be resorted to is the division of the nerve above the wound.

Dr. Wilson, of [illegible], was called to see the housekeeper of a family, who had been let blood two days before by a gardener. The wound which had been the seat of pain, that had extended to the shoulder, was not healed, was inflamed, and a thin liquor oozed from it. The patient had been in strong convulsions, which, having subsided, returned on the examination of the wound by Dr. Wilson. A tourniquet [illegible] a remission of the spasms followed, when an anodyne was administered: but the convulsions, after a short interval, recurred; and the application of the tourniquet being tried again, produced no effect. A transverse incision was then made above the puncture of the vein, in order to divide the nerve which was supposed to be injured: no mitigation of the symptoms, however, followed. But upon another incision being made deeper and longer, the patient cried out, to the astonishment of the attendants, "I am well! I am quite well! I can stir my arm!" when she began to move, and continued to do so with great delight for some time in various ways. She had no return of the spasms, and very soon got well.

In connection with the preceding case, in which the greatest benefit ensued upon the *immediate* division of the nerve, the three following, from Mr. Swan, are of great interest. In the first, the nerve was not divided, and the patient died: in the second, the nerve was not divided, but the attendant circumstances were less unfavourable, and the patient lived, her health slowly but gradually improving. In the third, the nerve was divided on the twenty-second day: it was then too late. The irritation had extended from the wound, and invaded the injured nerve above.

"Immediately after opening a vein in the right arm of a woman, there came on the most excruciating pains, which could not be appeased by any remedies; violent inflammation followed; then spasms: at length, being weakened by pains, watching, and want of food, she fell into epileptic fits, brought forth a dead fœtus, and died at the end of a week."—*Bonetus.*

"A female was bled in the foot. This slight operation was very painful, and was soon followed by convulsive motions, which extended themselves through the whole of the wounded extremity, and then through the rest of the body. These symptoms were unaccompanied by any tumefaction, and were very often renewed. The patient could neither walk, nor ride in a carriage. This state having continued a long time, notwithstanding the use of antispasmodics and quieting remedies, I advised a division of the saphenus nerve; but it was not consented to: nevertheless, the ner-

[illegible] and the patient partly [illegible] almost con- [illegible]

[illegible] wounded the [illegible] second finger of the [illegible] which ex- [illegible] after some days, [illegible] and in the [illegible] of the [illegible] Without detailing the [illegible] it will be sufficient [illegible] was divided in the finger [illegible] The consequence was imme- [illegible] nervous symptoms again [illegible] and their gradual aggravation finally [illegible] amputation of the finger at the [illegible] The impression on the nervous system [illegible] had been too deeply made to be removed: and the patient, although benefited by the operation, con- [illegible] the date when the last report of the [illegible] nervous irritation.

[illegible] appearances in the amputated finger, [illegible] wound, a small [illegible] the end of [illegible] with the cicatrix, the [illegible] At the place of the [illegible] first operation, both extremities [illegible] incorporated with the cicatrix; [illegible] branch, which had also [illegible]

[illegible] supervene after cicatrization of [illegible] the nerve above becomes [illegible] remedy. It is true, indeed, [illegible] may even then be confined to [illegible] an operation will remove it. [illegible] three cases of nervous irritation [illegible] he had [not divided the nerve, [illegible] finer practice] dissected out the [illegible] two of these cases, the operation was followed by the patient's direct recovery. In the third no benefit resulted. And it is always to be feared, where the nervous symptoms have been slow in coming (and therefore have been present for many days), that they are dependent, not more upon the injured point of the nerve than on an irritation involving its whole length; which of course can be little affected by a section of the nerve, or the removal of the cicatrix. Time and general treatment are to be relied upon in such cases more than operative surgery.

The following case I select, to exemplify the general inutility of the division of a nerve under these circumstances: it exemplifies, besides, the return of sensibility through anastomosis with other nerves.

Matilda Fuller, ætat. twenty-five, a fortnight before Christmas last, was cleaning a table-knife, when it slipped, and cut a deep oblique wound on the outside and to the back of the base of the first phalanx of the fore-finger of the left hand. The wound healed in a week. In another week the hand swelled, and she then observed that the back of the fore-finger, beyond the scar, was numb: the cicatrix itself was very sensible on pressure: at the same time the arm began to be painful, and her hand became weak and powerless; the fingers were half bent; she could bend them a little more, but could not extend them, except by using the other hand. The pain she described as a gnawing pain; it extended along the radial branch of the spiral nerve, then along the trunk of that nerve to the shoulder: moving the hand or arm increased the pain. Having tried various remedies ineffectually, on the 26th of March I divided the radial branch of the spiral nerve, where it lies on the back of the wrist; a third of an inch was then removed from the lower end of the nerve. The patient seemed to feel pain (but it is hardly credible that she did so) at the second section of the nerve. The effect of the division of the nerve was to remove instantly the former pain, and to restore a great deal of freedom and power to the motion of the hand and fingers: but it produced a very disagreeable sense of numbness in the back of the thumb, fore and middle fingers, and the corresponding surface of the hand.

ject, in the sixteenth volume of the Medico-Chirurgical Transactions, recommends, as a means of preventing the ends of nerves becoming enlarged after amputation, the removal of a second portion of each nerve which may have been left so long that it would not otherwise be well buried in flesh on bringing the parts together. The patient hardly feels the second section of the nerve.

When nervous irritation has been set up from this cause, and is exclusively dependent upon the bulbous enlargement of the end of the nerve, it may be relieved either by re-amputation of the stump, or excision of the extremity of the nerve. The latter operation is to be preferred, if the symptoms are clearly attributable to an affection of one nerve. The following case is an example in point.

A man, about thirty-five years of age, was admitted into the Middlesex Hospital in the course of the last autumn, whose leg I had amputated below the knee, for compound fracture, about two years before. It was, to the best of my recollection, half a year before the re-admission of this patient that the stump began to be painful. The pain was described as a constant and severe gnawing pain: it was principally felt at the end of the fibula, from whence it extended to the knee and ham. The cicatrix covering the end of the fibula was exquisitely sensible, and the muscles of the stump were in a state of perpetual quivering: the cicatrix appeared to grin, from the successive traction of different packets of the muscles. Supposing the symptoms to depend upon an enlargement of the end of the superficial peroneal nerve, I cut down to the fibula, and removed about the half of a square inch of integument and cicatrix covering it, with half an inch of the fibula, and some thickness of the flesh attached to it, including the superficial fibular nerve. The end of this nerve was found to terminate in a small bulb behind the cicatrix. [*i.* 20.]

The severe pain which the patient had suffered for months was instantaneously removed by this operation. While the wound was healing, however, some pain and tenderness reappeared in the direction of the fibular nerve: but on applying leeches, and administering calomel every night for a

My reason for conjecturing the seat of the irri- possibly not extend beyond what remains of the the following case.

about three months ago under my care, as an out- of the Middlesex Hospital, a woman whose arm Bransby Cooper had amputated at the shoulder joint neuralgia, which had followed an amputation above the and had returned after a second amputation above elbow. She told me that she was perfectly cured by the third operation, of the pain she had undergone so much to get rid of.

The extension of nervous irritation from the stump to the origins of the nerves may be exemplified by the following case, in which the symptoms, decided in character, but of no great severity, spread secondarily from the spine down the other leg.

Susan Briggs, ætat. thirty-five, was admitted into the Middlesex Hospital, in February last, with neuralgia. Eight years ago, Sir Benjamin Brodie had amputated the left leg below the knee, for disease of the ankle joint. For the seven ensuing years, this patient remained well; but, during the last twelve months, she had experienced pain and tenderness of the stump, pain extending up the thigh to the sacrum, accompanied with pains of the right leg, occasional cramp of the muscles of the right leg, and a remarkable and permanent retraction of the toes, and occasional numbness and thrilling sensations extending to the sole of the right foot. The tenderness and the principal pain were diffused over the extremity of the stump. On examining the back, I thought that I detected some tenderness at the upper spinous process of the sacrum: an issue was accordingly made at this part, and five grains of Plummer's pill given each night. These remedies were apparently of no service. Afterwards, strips of belladonna plaister were applied round the stump, and carbonate of iron was given in considerable doses. The patient stated that she derived benefit from this treatment; and certainly her general appearance improved. She left the hospital after two months, as she said, in much less pain, and evidently in better health.

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[illegible] of the arm have bee
[illegible] The symptoms have
[illegible] to give way. Bli
[illegible] to touch the gum
[illegible] of these cases
[illegible]

received a violent sprain of his thumb by the weight of his body being thrown upon it, in saving himself when nearly thrown off by a sudden motion of his horse. He was afterwards liable to paroxysms, in which his thumb was first bent in towards the palm of his hand; spasms then took place of the muscles of the arm, after which he became insensible, and continued so for about a quarter of an hour. The attacks returned frequently in the arm; but it was found that the pressure of a tourniquet prevented the insensibility. A nerve in this case was divided without success. The tourniquet lost its effect in arresting the spasms, and he died suddenly after three months; but there was no examination of the body *.

II. In many of the cases already given, the immediate cause of the nervous symptoms may have been increased action or inflammation of the vessels of the injured nerve.

In the case of Matilda Fuller, page 137, the divided nerve was larger and more vascular than usual. What is supposed to be inflammation of the sheaths of nerves is no unfrequent consequence of exposure to cold. I have seen it in the nerves of the arm, and it is perpetually met with in the form of sciatica. The symptoms of the affection are pain, numbness, and thrilling sensations in the course of the nerve, occasionally combined with spasms of the muscles supplied by it, and tenderness on pressure over its course. The following case, where the disorder was brought on by violence, may serve to exemplify this affection.

Luke Reany, ætat. thirty-five, on the 11th of March, 1835, fell backwards, striking his loins against a low iron rail. He was raised up by the bystanders, when he contrived, though in much pain, to walk home. The pain increased, and extended to the groin, which was swollen; and to the testicle, which was retracted: the bladder became affected, and he passed frequently small quantities of high-coloured urine. Purging and cupping on the loins greatly mitigated these symptoms, and gave prominence to others which had existed from the first twenty-four hours: these

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* Phil. Trans. 1801.

[illegible] of the sciatic nerve
[illegible] spasms of the thigh and
[illegible] below the knee, took
[illegible] with rest, cupping on the
[illegible] issues over the sciatic
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[illegible] and left the Middlesex Hos-

[illegible] conclusion of his profound and
[illegible] the Brain and Spinal Cord,—
[illegible] borrow in the succeeding
[illegible] instances of affections of
[illegible] the following as illustrating

[illegible] in which there had been violent
[illegible] by palsy (and in which re-
[illegible] for the time the paralytic affections
[illegible] dark-red colour of the substance
[illegible] a defined space, perhaps an
[illegible] In a similar affection of the right
[illegible] by palsy of the limb, he ob-
[illegible] nerve involved in a quantity of
[illegible] In another case he found a dis-
[illegible] nerve, which was an inch and
[illegible] about double its natural size:
[illegible] colour, and strewed through-
[illegible] the size of a pin's head.
[illegible] within the sheath of the nerve,
[illegible] substance of the nerve, and separating its
[illegible] Martinet found in the sciatic nerve
[illegible] of pneumonia who had been affected
[illegible] the posterior part of his thigh, aggra-
[illegible] so as to make him cry out.
[illegible] among the fibrils was found by Martinet in
[illegible] a man who died of disease in the head
[illegible] who had been affected during the latter
[illegible] with violent pain in the course of the
[illegible] The cellular texture surrounding the dis-
[illegible] nerve was also penetrated by pus.

Ulceration of the substance of the peroneal nerve was met with by Mr. Swan in connection with a fungous ulcer of the leg. There had been violent pain of the whole leg and thigh, which had rendered amputation necessary: in many parts of the limb, the nerves were found considerably enlarged.

Inflammatory swelling and suppuration near the ear, from external violence or otherwise, are liable to produce palsy of the portio dura.

III. It is analogically probable, that nerves are subject to hypertrophy and atrophy. In the case last described, it is mentioned that the nerves of a diseased leg were found enlarged. When an organ of sense is destroyed, its nerve wastes [*i.* 20.]: the same happens to the distal part of a divided nerve, when no union takes place.

IV. Tumours are liable to form in the nerves: they either are solid, or are cysts containing liquid. Their common situation is between the nervous fasciculi. The pressure which they make upon the nerves sooner or later gives origin to local pain and numbness; in severer cases, to convulsions and epilepsy; — in short, to the whole train of symptoms which have been already enumerated as consequences of local irritation of a nerve.

In a remarkable case by Portal, a woman was cured of epilepsy by the removal of a tumour which had formed on one of the nerves of the thumb. The slightest pressure upon it had given pain, and frequently brought on epileptic convulsions.

The practical questions which present themselves in connection with this subject are various.

Suppose that a patient suffers a train of symptoms referable to a single nerve, and that a lump is to be felt at one part of the course of that nerve, pressure upon which aggravates the symptoms: the following alternatives present themselves.

The tumour may not be in the nerve, but resting upon it.

The tumour may be implicated with the superficial fasciculi only of the nerve.

The tumour may be intimately implicated with all the nervous fasciculi.

In either of these cases, the tumour may be a solid or a cyst.

The tumour again may be upon a small nerve; as, for example, the internal cutaneous nerve of the arm, the division of which would not materially interfere with the functions of the limb; or on a great trunk, as the sciatic, after the loss of which the limb would, in the most favourable event, remain a troublesome incumbrance.

It is evident to what practical conclusions the preceding considerations point. Supposing the remedies by which swellings are dispersed to have been properly but ineffectually tried, there remain the following measures.

The exposure of the tumour, which — if separable from the surface of the nerve, or from the body of the nerve at the expense of a few fibres, should be removed, whether solid or a cyst; — if completely implicated with the whole structure of the nerve, and that nerve a small one, should be removed with the portion of nerve involving it; — if so implicated, and *the nerve the sciatic*, and the tumour a cyst, the cyst might be punctured, and the fluid evacuated, every precaution being subsequently taken to unite the wound by adhesion, leaving the chance of the fluid not reaccumulating. In the last case, supposing the tumour to prove solid, another question might still arise; — whether, the nerve being first divided above the tumour, the latter would not admit of being dissected out of the so palsied nerve, with more probability of safety to the patient, than if the nerve to be operated on were left in communication with the brain. Of course if in such an operation the tumour should be found to implicate the nervous structure, or to leave no separable and wholesome fasciculi, the operation must be abandoned.

V. When the varieties of nervous affections, which have been described, have been separated from the mass, there is still left a class, which, from its obscurity and difficulty of treatment, has a yet higher interest. The cases of this class are the intermittent pains in the direction of particular nerves, which bear the name of *tic douloureux*. What is considered with or without justice as the distinguishing character of these cases is, that the symptoms flow from nervous irritation, determined by no lesion of or tumour in the nerve, but proceeding from a variety of causes, acting by remote or contiguous sympathy, the nature of which regulates the treatment of individual instances. It is probable, that, with improving medical science, tic douloureux will eventually disappear in nosology, as in the pathology of the joints the vague term of white swelling is already falling into disuse, now that the different individual affections which used to be grouped under it are classified with pathological precision. And even in the history of the different shades of tic, which I have now to enumerate, the basis of such a distinction may be traced, and the general and vague character which I have assigned to the complaint, already begins to shape itself into groups of features, some of which show a near alliance to the definite forms of disease which have been recently described.

The intermittent and even periodical character which attends pain from any affection of the nerves is often well marked, even when the cause is constant, definite, external, and mechanical.

Mr. Swan mentions a case of popliteal aneurism, in which violent pain of the leg used to come on every night at half past ten, and go away about two in the morning. The pain was never felt after the operation.

Disorder of the digestive organs is one of the causes of tic douloureux.

A gentleman was taken ill through having eaten hashed hare cooked in a brass pan which was covered with verdigris. Some months afterwards, having not been well since, he had an affection of the nerves of the back part of the head, which caused excruciating pain. He had become weak and attenuated. He recovered through the application of a blister to the back of the neck, the free use of bark, joined with a dose of laudanum at the period of the morning when the pain was commonly most severe, and wine and malt liquor.—*Swan.*

The commonest seat of tic douloureux is the facial branches of the fifth nerve, especially the infra-orbital: in this case the cause is often in the state of the teeth, which [illegible] with violence. The [illegible] use of tonics after- [illegible] tonics alone in the [illegible] removing the complaint.

[illegible] suffered severely with the [illegible] the attacks were fre- [illegible] one tooth, which ex- [illegible] soundness. The tooth [illegible] was observed at its root; [illegible] slight attacks, and [illegible].

[illegible] President of the Col- [illegible] after the exfoliation [illegible].

[illegible] produced by thickening of [illegible]

[illegible] Dr. P. after death, [illegible] of the os frontis where [illegible] frontal sinuses, and at [illegible]. He had twice suffered [illegible]. There was discovered [illegible] of the dura mater, a little [illegible] osseous substance, [illegible] length, rather less in [illegible] thickness.—*Halford.*

[illegible] thickening was observed [illegible] sphenoidal bones, in one part [illegible] and the anterior lobes of the [illegible] indented by the thickened [illegible]

[illegible] occasionally produced by a congestive [illegible] vessels of the brain.

[illegible] described the case of a lady, who [illegible] the infra-orbital nerve. The pulse [illegible] therefore sixteen ounces of blood were taken [illegible]. Three days after, she thought herself re- [illegible] but as the pulse continued still very full, twelve [illegible] more of blood were taken away. Three days after [illegible] bleeding, she was bled again to sixteen ounces.

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The tumour may be intimately implicated with all the nervous fasciculi.

attempt to extend them was accompanied by insupportable pain. The joint of the elbow also was contracted. After some time the other arm was slightly affected in the same manner, and she had likewise pain and great debility of both the lower extremities. After this affection had continued about a year, it got well under the use of a liniment composed of olive oil, turpentine, and sulphuric acid. This produced most severe erysipelatous inflammation, which, beginning upon the affected arm, extended afterwards over the whole body.

SECTION II.

Of the Nerves in reference to Nutrition and Secretion.

Very little is known of the pathology of nerves, in relation to their automatic functions. It is, however, well established, that parts from which the nervous influence is withheld have less vitality, and are more disposed to inflame and suppurate and slough than other parts.

The limbs of animals, in which the principal nerves have been divided, frequently mortify: and in human beings, whose limbs are completely paralyzed by disease, the skin is found to inflame and vesicate through slight causes, such as a moderate heat, which would not blister the skin in health.

It has been further rendered probable, by the experiments of Magendie, that the nerves of touch are those upon which the support of healthy nutrition mainly depends. He found, that, after dividing the fifth nerve within the cranial cavity of rabbits, ophthalmia supervened, which left partial opacity of the cornea.

It likewise appears, that the principal organic effects of division or disease of nerves result in part only from the interruption of continuity with the brain. In some of his experiments, Magendie divided the fifth nerve further from its origin, interrupting, not only the connection with the brain, but by destroying it, the influence of the ganglion of Gasser besides. The consequence of this injury is, that not the surface only of the eye inflames, but its whole interior structure; it suppurates and perishes.

Instances are not uncommon of the combination of anæsthesia of one side of the face produced by disease, involving the origin of the fifth nerve, with ophthalmia. I have seen several cases of this nature, upon which the experiments of Magendie not only have thrown a clear pathological light, but have likewise led to an improved and efficient treatment.

The following case exemplifying the disease, occurred to Dr. Alison, of Edinburgh.

The patient had loss of common sensation in the left side of the face, the left nostril, and left side of the tongue; with insensibility of the ball of the eye, and occasional bloody discharge from the left nostril; and was liable to attacks of pain occasionally accompanied with fever, during which the pain was principally referred to the insensible parts. There were frequently attacks of inflammation of the left eye, with dimness of the cornea, which was relieved from time to time by the usual antiphlogistic means; but at the end of two months, a line formed round the base of the cornea, which at length sloughed out, and the contents of the eye were entirely discharged. The muscles of the left side of the jaw were paralytic, and felt quite flaccid when the patient chewed or clenched his jaws; but the motion of the muscles of the cheek was unimpaired. After the destruction of the eye, the paralytic symptoms remained stationary for a year or more: there was then a violent return of headach, with fever; and death, in a state of coma, after an illness of a fortnight. On inspection, there was found considerable softening of some of the central parts of the brain. The fifth nerve of the left side, on being traced backwards from the ganglion, was found close to the ganglion to be of a very dense texture; but beyond this, it was much wasted; and at its junction with the tuber annulare, nothing but the membrane seemed to remain. — *Abercrombie.*

A patient was under my care, in the Middlesex Hospital, for fracture of the middle lumbar vertebra: he had palsy and anæsthesia of the left leg. Before his death, inflammation of the mucous membrane of the bladder supervened; the urine had an ammoniacal odour, and was loaded with viscid mucus. The left nerves of the cauda equina had been inflamed, and adhered together and to the theca through effused lymph. [illegible]

The inflammation of the lungs and of the stomach, which follow division of the pneumogastric nerves, are phenomena of the same nature with the preceding, and result from interruption of the nervous influence.

Dr. Abercrombie supposes,—and the same conjecture had occurred to myself,—that the painful wasting of muscles which has been described in a previous chapter as the occasional result of exposure to cold and damp, may depend upon affection of the nerves. In one of the two cases which I have given, and in which the deltoid wasted, the principal pain was constantly felt in the situation of the circumflex nerve.

Of the affections and pathological influence of the visceral nerves, nothing can yet be said to be sufficiently established. It is probable that enlarged glands, or morbid deposits pressing upon the pneumogastric nerves, may derange the functions of the larynx, the lungs, and the stomach. It is likely that diseases of the sympathetic nerve, and the semi-lunar ganglia, may cause or be produced by diseases of the heart and bowels. The evidence, however, we yet possess upon this subject is of so doubtful a character, as only to render the obscurity of the subject more visible.

CHAPTER V.

OF THE SPINAL CORD.

The spinal cord is that portion of the central organs of the nervous system which is situated below the decussation of the anterior pyramids, or which is contained in the vertebral canal.

The spinal cord, like the nerves, both ministers to consciousness, and exerts an influence over vegetative life. Like the nerves, it has distinct fasciculi for sensation and volition. Like the nerves again, in reference to consciousness, it may be considered, in part at least, as an organ of transmission, and altogether as exercising a dependent function. The division or crushing of the spinal cord palsies the portion of the frame supplied with nerves from below the injured part, as certainly as a parallel effect is produced by the division of the trunk of a nerve.

But the dependence of the spinal cord upon the enkephalon is not exactly of the same nature with the dependence of the nerves upon the cord. The spinal nerves arise—that is, begin or end — in the spinal marrow, and have no power independently of their connection and continuity with it. The spinal cord in the same way is a production of the enkephalon, and has no part in consciousness but when in continuity with it: still it possesses forces which are not derived from the enkephalon. The spinal cord with the spinal nerves forms thirty-one separate organs; each organ consisting of a segment of the grey and white matter of the spinal cord, and the pair of nerves originating in it. Each of these organs in one sense is independent of all the rest; one of the sentient nerves belonging to it being irritated, the impressupplied with nerves below the place of lesion, that is, it may produce either paralytic, or anæsthetic, or complete paraplegia. On the other hand, pains and spasms and cramp may flow from affections of the spinal cord.

Concussion, compression, division of the cord, produce as their immediate consequences complete paraplegia. Inflammation of the substance of the cord and of the membranes produce local pain, palsy, and spasm, but in general palsy predominates in the former, spasm in the latter. Constipation of the bowels, and incontinence or retention of urine, are usual attendants of disease of the spinal cord.

The following cases will serve to exemplify the principal features in the pathology of the cord.

a. Concussion of the spinal marrow may produce complete suspension of its functions. In a case given by Boyer, complete paraplegia had been instantaneously produced by a fall into a ditch: the patient died. On dissection, no disease could be discovered either in the head or spinal canal. Frank mentions four fatal cases of concussion of the spine, on the post-mortem inspection of which no change in the spinal marrow was detected, or injury of the vertebral column. Instances of this description throw light upon the nature of those cases of more frequent occurrence, in which persons recover after all varieties of palsy and anæsthesia, that have instantaneously followed blows or falls upon the back. In all such cases, however, there is a threefold risk—first, of the palsy being quickly followed by death; secondly, that the concussion (having been attended or not by ecchymosis of the nervous substance) [*k.* 10.] may give rise to disease of the spinal marrow, vertebral column, or both; thirdly, of the palsy being permanent.

There are some remarkable instances of wounds of the spine with recovery.

A young man was struck on the back of the neck with a poniard, three fingers' breadth below the left ear, the wound penetrating obliquely towards the right. Immediate loss of sense and motion of the whole body ensued, the head alone feeling. During the first few days, there was retention of urine and constipation: afterwards, involun-

knows that he pitched upon the upper part of the back, because his coat was cut through at this part, and his shoulders and back were bruised. He was lifted up, and soon recovered, and walked to his room. No symptoms supervened for a month, during which he recovered from the bruise, and lived heartily as before the accident. He was then, without any warning, seized with spasm in the left foot and hand; the spasm went off in a few minutes; but the left hand and arm remained weak and numb. This was attended with pain of the back part of the head, and occasional confusion of thought, and aching and shooting pains between the shoulders; he had also frequent desire to make water, which came on suddenly with great urgency. He continued in this state about a fortnight, when he had twitchings in the arm and leg, and gradually recovered the use first of the arm, and then of the leg. A fortnight after the restoration of his arm and leg, his right side was taken much as the left had been. This again got better. At the time of, and for six weeks after, his admission, he was liable to spasmodic seizures of the hands and feet, which lasted a few minutes; the pulse during the seizure was frequent and feeble: the skin cold and inclined to rigor; his limbs were weak, and he had pain at the back of the head, and occasional confusion of thought. On striking the upper dorsal vertebræ, an obscure and deep-seated pain was felt in the part. He has now for several weeks been entirely free from symptoms [August 17]. He has remained in the hospital; been cupped upon the back, had issues applied over the part which was struck; and for six weeks the mouth was kept slightly affected with mercury.

b. Simple *pressure or division* of the spinal cord above the origin of the phrenic nerves, is instantaneously fatal. The lower the injury, the longer is the period the patient may survive, and the greater the small probability of ultimate recovery. [*k.* 15.]

When the spinal marrow is cut across,—as by a musket ball, or lance, or sabre wound, at or below the lowest cervical vertebræ,—or is torn in fracture of the vertebræ,

[illegible] the head being at the
She sank [illegible]
, the spinal marrow and its mem-
from disease; but there existed a
-al vertebræ [illegible]
tained [illegible] of what I
d pus [illegible] had the appearance and
This rested upon the anterior sur-
of the vertebræ, which with the inter-
had been partially absorbed [illegible] the
now were remarkably [illegible] and firm, and
overed with strong fibrous membrane
ng indicative of recent disease.
ng case, with so little apparently to produce
that attended it, may be contrasted with the
hich exemplifies the opposite extreme.
leyon, ætat. thirty-eight, had experienced, for
od, pain at the upper and back part of the neck
on,—that of swallowing, or even breathing,—
d it. The neck became drawn backwards and
y the instinctive action of its muscles. She died
lly of phthisis, the cough attending which added to
uffering. Some little difficulty of swallowing and
eathing she had experienced, but no palsy or anæs-
sia.

On inspection, the odontoid process and the transverse ligament were found to have perished by caries and ulceration. A displacement forwards of the atlas upon the dentata had taken place to such an extent, that the articular surfaces of the latter were covered on their anterior half only by those of the atlas. — *Ollivier.*

e. Inflammation of the substance of the cord. — A gentleman, who was liable to epilepsy, complained of uneasiness of the throat, with difficulty of swallowing, accompanied by acute pain in the neck and occiput, followed by fever, embarrassed breathing, and vomiting; he then was seized with numbness of the left hand, which speedily extended up the arm: the right was immediately after affected in the same manner; and on the following day they were both paralytic.

Pressure upon [illegible]
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pressure made [illegible]
the head, made [illegible] system be
pressure of the [illegible] diminished
three-sided of [illegible] pulley of the
reclining [illegible] pressure arose
with a [illegible] in the automatic
thrown [illegible] the power of
which [illegible] few days before
were [illegible] the speech impa
ability [illegible] complete.

21 [illegible]—The whole cord
age. [illegible] one part entirely
There [illegible] softened on its anter
were [illegible] of the annular
he [illegible] syncopation, after recoveri
and [illegible] with pain in the back
the [illegible] of limbs, involuntary
[illegible] of the legs increased
[illegible] sensations were
[illegible], and after lying a
[illegible] of the membrane,
[illegible] of the back the cord
[illegible], and disorganised.—
[illegible] fibres, was

[illegible] and the neck, and stiffened the neck: it gradually moved down the spine, to the lower part of which, after several days, it became fixed, being more severe at this part than it had before been when occupying the upper part of the neck, and extended round the crests of the ilia, with great tenderness of the belly, and pain and difficulty in passing the urine. On the 13th, great increase of suffering, even when the patient was continually walking about, grasping the lower part of the back with his hands; remission again. On the 17th, convulsive twitches of the face; difficulty of swallowing; squinting, not permanent; pulse from 120 to 130. After bleeding from the arm, he appeared relieved, and lay down in bed: he soon rose, and became restless and unmanageable: then threw his head back, fell into a state of coma, and died in two hours.

Inspection.—Brain healthy: gelatinous deposit under the [illegible] arachnoid: the spinal cord covered with purulent matter, which lay between it and its membranes—the matter most abundant near the foramen magnum; substance of the cord itself soft, and in some places much divided into filaments.—Abercrombie.

The preceding case is valuable from the general absence of symptoms, which are thus shown to be in some sort accidental to the inflammation.

The symptoms commonly present are—strong extension or incurvation backwards of the spine, with retraction of the head, the spasm sometimes extending to the limbs; pain in the back, sometimes a prominent feature, sometimes developed on motion only: pain and difficulty in passing the urine: paraplegia is an occasional, but by no means a common attendant. [p. 30.]

A child, between three and four years of age, died with symptoms of opisthotonos, difficult deglutition, and coma. There was found, on the post-mortem inspection, a deposition of a red and very consistent fluid in the cellular texture, between the dura mater of the cord and the canal of the vertebræ in the dorsal region; serum within the membranes; and the arachnoid of the cord covered with albuminous secretion for four inches.—*Ollivier.*

The following case, which presents some unusual features, I suppose to have been threatening inflammatory affection of the cord or its membranes.

Mrs. H. B., ætat. thirty-four, married, mother of three children, while suckling the second, more than two years ago, first observed a quivering in the flesh of the right fore-finger, which came and went: after two or three months the left hand was similarly affected. Not many weeks after the first attack, the hands would swell, then become numb, with a gnawing pain extending to the elbows: these attacks lasted for several hours. In one seizure, the hands were in addition spasmodically contracted, being bent backwards at the wrists, and the fingers stiffened and drawn together. In April, 1834, two or three days after menstruation, the pain and all suddenly and entirely went away; she did not at the time conjecture that she had then become pregnant: but she did not again menstruate, and was confined exactly nine calendar months from the termination of the period which was followed by her temporary recovery. A week after confinement, now suckling her infant, she observed the quivering in the hand recommence.

A few weeks later [March 21st], I was asked by Mr. Angus, of Greek Street, to see this patient. The disorder had extended its sphere. The muscles of the great toe on each foot had fits of quivering, sometimes attended with pain, like those of the thumb and fore-fingers; the quivering, however, occurred occasionally in the feet only, and equally in both; but was constant in the hands, and worse in the right: the cheeks, eyelids, and tongue, at times, to use her own expression, were likewise "on the work." She was otherwise in perfect health; yet had experienced, in addition to these slighter symptoms, one attack of spasm of the hands, only slighter than before. The spasm and pain displayed different features in the upper and lower extremities. In the lower, the pain and sensations and action seemed to strike from the toe upwards to the knee, where the effect became most feeble, and ceased: so formerly had it been with the arms: but when the pain in the arms had by slow degrees extended to the elbows and then to the shoulders, and afterwards to the neck, [illegible] downwards [illegible] On examining [illegible] was disco-vered [illegible] was [illegible] It was likewise [illegible] The effect of the two reme-dies [illegible] her amendment [illegible] attack of violent spasm [illegible] a few days after [illegible] Mr. Angus relieved by [illegible] a purgative enema: but, with [illegible] the state of the [illegible] continues to improve to the [illegible] but slight numb-ness [illegible] there is no pain in the hands, and [illegible] perfect health. The [illegible] that, as preg-nancy [illegible] another general altera-tion of the state of the frame, and [illegible] of blood to new channels, might [illegible] a like result.

The history of the case goes to May [illegible] The patient has [illegible] except occasional [illegible] of the muscles of the right thumb, which [illegible] or been worried.

[illegible] Effusion in the Spinal Canal.—The observations of [illegible] that a sensible quantity [illegible] between the arachnoid and pia mater [illegible] An increased secretion of this fluid [illegible] common form of disorder. The following [illegible] may serve to exemplify it.

A man, [illegible] was affected with acute pain and [illegible] in the lower dorsal vertebræ, the pain occasionally [illegible] upwards or downwards to the top and bottom of the spine. After seven days, he was seized with palsy of the right lower extremity, and, in three days more, with retention of urine. The pain was now so acute as to prevent him from lying down; and was soon after accompanied by [illegible] and tonic convulsions of the trunk [illegible] which recurred at intervals, and continued for

[illegible]

[illegible]

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ok [illegible] which were [illegible]
[illegible]. A [illegible]
of bone was found in the [illegible]
[illegible] about the [illegible]
[illegible] sixty-one, [illegible]
y, when he [illegible]
from the [illegible]
, he was seized with paraplegia and [illegible]
and fever; and he [illegible]
num, who had been [illegible]
palsy. There was extensive [illegible]
pinal canal, under the [illegible]
part it formed a [illegible]
in which the substance [illegible]
shed as far as the [illegible]
where the cord was [illegible]
l very soft.

osits between the Membranes [illegible] — [illegible]
f small thin flakes of cartilage, [illegible]
ich form in the cellular [illegible]

The legs were not in the least affected, nor the functions of the bladder or the bowels. He died on the eighth day, having preserved his intellects to the last.

Inspection. — There was extensive softening of the upper part of the cord, chiefly of the grey matter, which was of a rose colour, with a highly vascular state of the membranes.—*Ollivier.*

In another case, with extensive softening at the upper part of the cervical portion, extending nearly through the whole thickness of the cord, there was palsy of all the limbs.—*Ollivier.*

In a case described by Dr. Abercrombie, the progress of the disease was slow, and lasted from October to the July following: the symptoms being coldness and numbness of the feet, with diminished power of motion: after several weeks, complete palsy of the legs, and inability to empty the bladder; tightness across the abdomen; spasms like opisthotonos. In the intermediate April, some amendment occurred, with the power of moving the legs when supported by crutches. Two days before death, the right arm became paralytic, and his speech impaired. The loss of sensation was never complete.

Inspection. — The whole cord was of a pale rose colour, and was in every part entirely diffluent. The medulla oblongata was softened on its anterior part, as well as the adjacent portion of the annular protuberance.

A young soldier, after recovering from a petechial fever, was affected with pain in the back, difficulty of moving the legs, retention of urine, involuntary discharge of fæces. The weakness of the legs increased to perfect palsy, in which the upper extremities were shortly after involved: he then lost his speech; and after lying a fortnight in this state, but in possession of his intellects, he died suddenly. At the lower part of the back the cord was in a state of suppuration, dissolved, and disorganized.—*Brera.*

A woman, ætat. fifty-six, was seized with loss of power of the limbs of the left side, without anæsthesia: voice feeble; speech embarrassed; pulse natural; respiration frequent. Death in a week from the seizure.

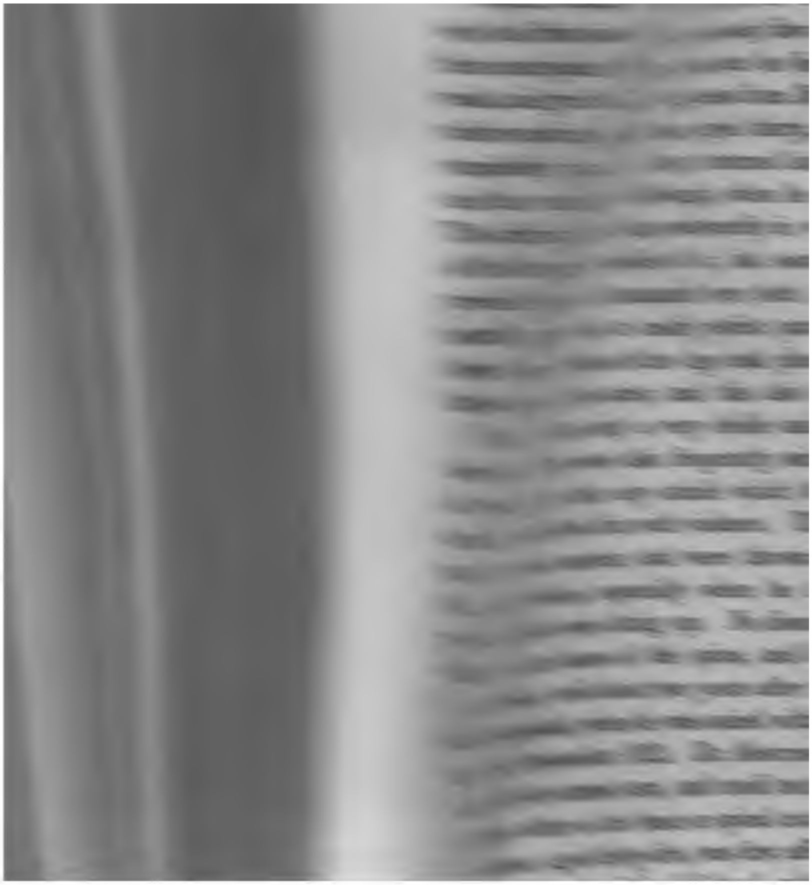
Inspection.—The brain sound, but the pia mater injected. In the centre of the right half of the cervical portion of the spinal cord there was a cavity, three inches long, by two or three inches in diameter, full of soft matter like pus; this became more consistent towards the parietes of the cavity, which were about a line and a half in thickness, and formed by the healthy white matter. In the left column of the same portion of the cord there was a like disease, but less extensive, being about one inch long, and one line in diameter: its contents were less purulent, rather resembling softening of the cord. The membranes of the cord were thickened at this part.—*Velpeau.*

It is difficult to preserve, in preparation, the appearance of softening of the spinal marrow. In [*k.* 20.] it is seen in combination with deposit of cartilaginous flakes in the pia mater.

The additional features of inflammation of the spinal marrow are, contraction of the limbs (either tonic or clonic), sensation remaining,—or with palsy, the sensibility heightened (hypertrophy of the posterior fasciculi of the spinal nerves being sometimes added),—the extent and character of the symptoms being dependent on the part of the cord attacked, and on the limitation of the changes to one half, and either to the anterior or posterior fasciculi.

Portal describes the case of the Marquis de Causan, in whom, in the space of a year, a gradual palsy of the left side, commencing in a prickling of the fingers, had supervened. Palsy of the right side gradually followed; sight, hearing, speech, deglutition, in succession failed. On dissection, the cervical part of the spinal cord was found to be *as hard as cartilage*, and its membranes were red, as if inflamed.

d. Inflammation of the Membranes of the Cord.—A gentleman, ætat. twenty-six, had been liable for several years to suppuration from the right ear, with occasional severe headaches, which were temporarily followed by a considerable increase of the discharge. The first week in April, 1817, he became ill, with headach, disturbed sleep, loss of appetite, but little or no increase of pulse. About the 7th, the



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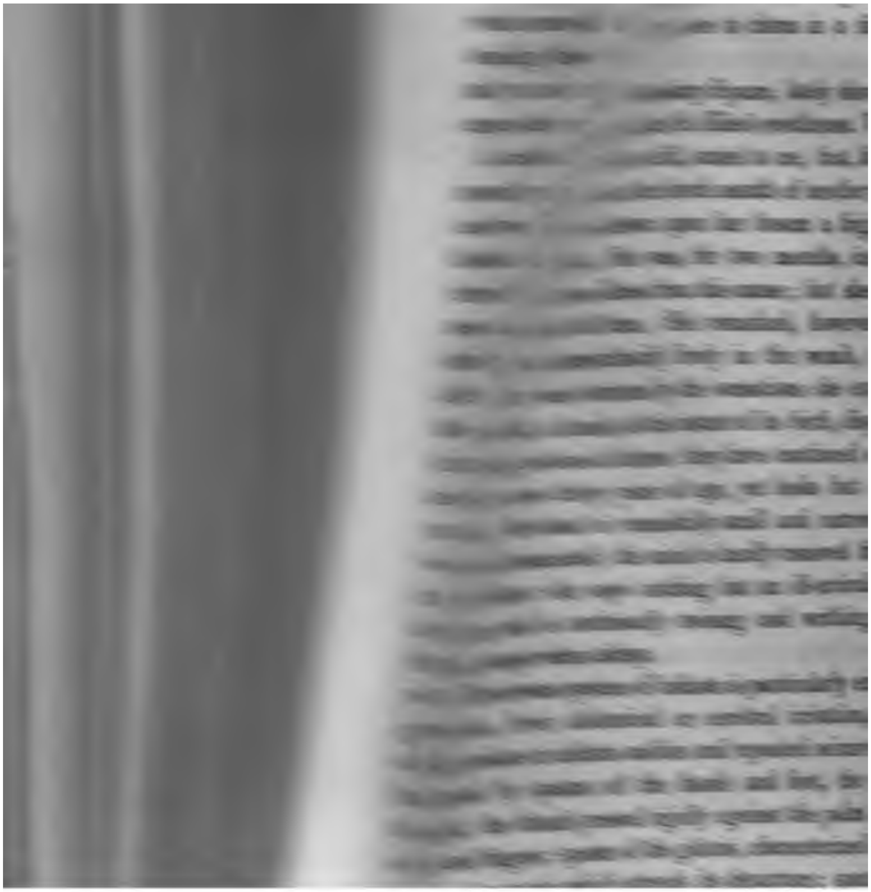

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[illegible] experiments, to show that
[illegible] of blood. In ani-
[illegible] blood-vessels remained well
[illegible] loaded with dark blood.

and the vessels of the pia mater were delicately filled with florid blood. In another, the sinuses were loaded with blood, the veins of the pia mater were well filled, and the chorioïd plexus was remarkably turgid. The converse facts [or that the healthy brain cannot be made to hold more blood] were made out in observations by Dr. Monro and Mr. Kellie conjointly, upon the brains of two men who had been hanged. On dividing the scalp in these cases, the blood flowed in such quantities as to afford ample proof of the congestion of the vessels exterior to the cranium; but no turgescence was observed in the brain. The sinuses contained blood, but in no extraordinary quantity; the larger vessels on the surface, and betwixt the convolutions, were but moderately filled; and the pia mater was, upon the whole, paler and less vascular than we often find it in ordinary cases.

The facts which have been thus quoted exemplify what is certain *à priori*,—that as the cranium is unyielding, if the brain remain unchanged, the pressure of the atmosphere upon the soft parts of the body will always keep within the cranium the same quantity of blood, and allow neither its increase nor diminution. So an alteration of the quantity of blood in the brain can never be a simple phenomenon.

There cannot be *less* blood in the vessels, unless the area of the cranium is partially occupied by some substance not there before. Accordingly, in some examples given by Dr. Kellie in his experiments, in which the vessels of the brain contained sensibly less blood than in the other cases, serous effusion was found. Extravasated blood, a tumour, the skull driven in, or cerebral hypertrophy, answer the same purpose as effusion of serum, and allow the brain to hold less blood in its vessels. There cannot again be *more* blood than before, unless the mass of cerebral substance is through some cause diminished.

But although alteration of the quantity of blood in the brain is necessarily a compound phenomenon, it is not so with the relative proportions of arterial and venous blood. When the circulation is loaded, the brain may be gorged with venous blood, and arterial blood find no entrance in adequate quantity; and thence stupor may supervene: on the other

The effects of inflammation upon this tissue are the following: — The degree of *softening* of the cerebral substance from this cause may vary, from a slight diminution of the natural consistence of the part affected, to that of cream or milk. The first stage of the softening is often so slight as to be hardly perceptible to the touch, so that even when considerable, if not accompanied by some peculiarity of colour, it may be easily overlooked. A gentle stream of water allowed to fall upon suspected surfaces of the cerebral substance, is the best means of ascertaining whether a portion of it has undergone a diminution of its natural consistence. As yet the cerebral substance is not broken down; it has only lost a certain degree of its cohesion: it is still continuous with the firm substance by which it is surrounded. In the second stage, the diminution of consistence is so great as to be recognized at first sight. Upon a section being made through it, the softened substance sinks by its own weight beneath the level of the rest of the cut surface; while parts that are naturally prominent, such as the thalami, corpora striata, and convolutions, being involved in the softening, are sensibly flattened. In the third stage, a solution of continuity has been effected by the separation and partial removal of the softened cerebral substance. The dissolved texture, now of the consistence of cream or milk, is contained in an excavation of variable extent, situated in the substance of the brain, or confined between the membranes and convolutions of this organ. The colour of the softened part is liable to be modified by an admixture either of blood or pus; and its consistence, at the same stage of the disease, by the greater or less proportion of membrane which remains undissolved in the softened cerebral substance. [*l.* 30.]

The nervous matter adjoining the softened part presents traces of increased vascularity, often in a very high degree; it is occasionally found hardened at different points. Abscess in the cerebral substance presents every intermediate grade between softening mixed with matter, matter contained in an irregular cavity of, and in contact with the [illegible] in a circumscribed [illegible].

3. Of Induration.—It has been already mentioned, that [illegible] of a softening of the brain, the in-[illegible] points, preter-[illegible] cerebri which was [illegible] of a portion of brain, [illegible] acquired an almost [illegible] of a bluish-grey colour. The medullary matter, though [illegible], was less so than [illegible] of a part of the enkephalon from [illegible] with hardening.

4. Tubercles and scirrhous tubercles, melanoma, medullary sarcoma, and cysts containing gelatinous fluid, form in the cerebral substance. (f. 41. f. 42. f. 43.)

II. Of the Pia Mater.—The external surface of the pia mater naturally secretes a certain quantity of transparent fluid, the use of which is to keep up an equal pressure upon all the irregular surfaces of the brain and spinal marrow. Its abnormal increase is very frequent: sometimes it may arise from obstruction of the cerebral veins; sometimes, as it is said, in marasmus, from feebleness of the cerebral circulation; but in general it is the consequence of a low degree of inflammation.

Sometimes small round tubercles form in vast numbers upon the outer surface of the pia mater, a consequence of prolonged subacute inflammation of the membrane.

In a higher stage of inflammation, the pia mater secretes semi-opaque or lactescent serum, containing albuminous flakes, purulent serum, pus (f. 46.) These deposits are more frequent upon the surface of the brain than in the ventricles.

Cysts containing serum are found in the pia mater, both of the choroid plexuses, and on the surface of the brain.

Flakes of semi-transparent elastic substance, resembling cartilage, varying in size and number, are found between the pia mater and arachnoid. It is conjectured that they are formed in the cellular tissue, which unites the two membranes.

Deposits of tuberculous matter, and of white matter of the same consistence, are met with singly, or in groups — as miliary tubercles of the pia mater. [*l.* 48.]

III. *Of the Arachnoid Membrane.* — Alterations of the arachnoid are less frequent than those of the pia mater. The arachnoid, however, is liable to be inflamed — to become slightly thickened and opaque—to secrete a viscid serosity—to secrete pus—to secrete lymph [*l.* 50.], which forms layers of false membrane that for a time remain nearly unattached, but subsequently become organized. The opposed surfaces of the two layers of the arachnoid are liable to contract strong partial adhesions [*l.* 51.]: malignant growths occasionally form below the arachnoid. [*l.* 52.]

IV. *Of the Dura Mater.* — The dura mater has two important relations—one to the cranial bones, of which it constitutes the principal periosteum: through this relation, it becomes the seat of all those alterations of structure which originate on the superficies of the bones. These changes have been already adverted to. To follow its second relation — upon its inner surface the dura mater adheres to the reflected arachnoïd, and rests against the soft substance of the brain, between the divisions of which it sends falces and tentoria. The habitudes under disease of its cerebral surface and productions are now to be considered.

The dura mater is susceptible of inflammation. Blood is sometimes found effused between the dura mater and the arachnoïd lining it, which that effusion has detached. Small collections of pus have likewise been found in the same situation.

Fibrous tumours, of the size of a nut, and larger, and of a tissue resembling that of the dura mater, sometimes grow from its inner surface: they commonly adhere to it by a narrow pedicle.

Tumours of a similar appearance are occasionally met with, which contain deposits of phosphate of lime, constituting osteo-fibrous tumours. [*l.* 55.]

Phosphate of lime is frequently deposited, in flattened masses, between the layers of the processes of the dura mater, especially in the falx cerebri. [*l.* 57.]

nervous substance, and matter inclosed in a circumscribed membranous cyst. [*l.* 33.]

g. Of Hardening. — It has been already mentioned, that in the neighbourhood of a softening of the brain, the inflamed texture is sometimes, at one or more points, preternaturally hard. In an instance of hernia cerebri which was under my care, the cineritious matter of a portion of brain, which protruded and was removed, had acquired an almost cartilaginous hardness: it was of a blueish-grey colour. The medullary matter, though hardened, was less so than the cineritious. Diminution of a part of the enkephalon from pressure is liable to be attended with hardening.

h. Strumous and scirrhous tubercles, melanoma, medullary sarcoma, and cysts containing gelatinous fluid, form in the cerebral substance. [*l.* 41. *l.* 42. *l.* 43.]

II. *Of the Pia Mater.* — The external surface of the pia mater naturally secretes a certain quantity of transparent liquid, the use of which is to keep up an equal pressure upon all the irregular surfaces of the brain and spinal marrow. Its abnormal increase is very frequent: sometimes it may arise from obstruction of the cerebral veins; sometimes, as it is possible to imagine, from feebleness of the cerebral circulation; but in general it is the consequence of a low degree of inflammation.

Sometimes small lymph tubercles form in vast numbers upon the outer surface of the pia mater, a consequence of continued subacute inflammation of the membrane.

In a higher stage of inflammation, the pia mater secretes semi-opaque or lactescent serum, containing albuminous flakes, purulent serum, pus [*l.* 46.] These deposits are more frequent upon the surface of the brain than in the ventricles.

Cysts containing serum are found in the pia mater, both of the chorioïd plexuses, and on the surface of the brain.

Flakes of semitransparent elastic substance, resembling cartilage, varying in size and number, are found between the pia mater and arachnoïd. It is conjectured that they are formed in the cellular tissue, which unites the two membranes.

Deposits of tuberculous matter, and of white matter of the same consistence, are met with singly, or in groups — as miliary tubercles of the pia mater. [*l.* 48.]

III. *Of the Arachnoïd Membrane.* — Alterations of the arachnoïd are less frequent than those of the pia mater. The arachnoïd, however, is liable to be inflamed — to become slightly thickened and opaque—to secrete a viscid serosity—to secrete pus—to secrete lymph [*l.* 50.], which forms layers of false membrane that for a time remain nearly unattached, but subsequently become organized. The opposed surfaces of the two layers of the arachnoïd are liable to contract strong partial adhesions [*l.* 51.] : malignant growths occasionally form below the arachnoïd. [*l.* 52.]

IV. *Of the Dura Mater.* —The dura mater has two important relations—one to the cranial bones, of which it constitutes the principal periosteum: through this relation, it becomes the seat of all those alterations of structure which originate on the superficies of the bones. These changes have been already adverted to. To follow its second relation — upon its inner surface the dura mater adheres to the reflected arachnoïd, and rests against the soft substance of the brain, between the divisions of which it sends falces and tentoria. The habitudes under disease of its cerebral surface and productions are now to be considered.

The dura mater is susceptible of inflammation. Blood is sometimes found effused between the dura mater and the arachnoïd lining it, which that effusion has detached. Small collections of pus have likewise been found in the same situation.

Fibrous tumours, of the size of a nut, and larger, and of a tissue resembling that of the dura mater, sometimes grow from its inner surface: they commonly adhere to it by a narrow pedicle.

Tumours of a similar appearance are occasionally met with, which contain deposits of phosphate of lime, constituting osteo-fibrous tumours. [*l.* 55.]

Phosphate of lime is frequently deposited, in flattened masses, between the layers of the processes of the dura mater, especially in the falx cerebri. [*l.* 57.]

In the vertebral canal, the external surface of the dura mater has not a periosteal character. In this situation it is liable to give origin to deposits of the consistence of tuberculous matter, either white or yellow, with which melanoma may be mixed.

SECTION II.

Classes of Cerebral Affections.

The disorders of the cerebral functions are so far from bearing an exact relation to the structural lesions which have been described, that to convey a true idea of their character and causes, it is necessary to give up the attempt to arrange them upon anatomical principles; and to be satisfied with grouping them in natural families upon resemblance of symptoms alone: examining afterwards with how various conditions of the brain, each disease may be associated; and endeavouring to trace the connection between its mental features and the physical condition of the organ.

The heads under which cerebral affections may be conveniently arranged, are apoplexy, palsy, epilepsy, derangement, inflammatory disease, concussion, compression from injuries.

§ I. *Apoplexy.*

Apoplexy is a more or less sudden and permanent oppression of the mental functions, varying in degree in its mental features from confusion of thought to complete stupor or coma. The following cases may serve to exemplify slight forms of apoplectic seizure.

A gentleman, fifty years of age, of a full habit, accustomed to live beyond moderation, had been harassed by business: in the afternoon while conversing with his lawyer, he stooped to pick up a pen that had fallen; when his senses seemed to leave him, but he knew that he went on talking: he recovered himself instantly, and stood upright;

his face was pale; shortly afterwards it became strongly flushed. He took opening medicine for some days, and has had no other symptoms.

A gentleman, aged seventy-nine, was at dinner and in conversation with his wife, when he seemed to have some difficulty in swallowing, and his speech became confused: he recovered a little, but became drowsy and disposed to sleep; the following day he appeared unable to collect his thoughts; when attempting to express himself, he used one word for another, and in attempting to find appropriate language, forgot the idea he was striving to express. There was slight pain at the back part of the head, the pulse was rather more frequent than usual, and unequal and occasionally intermitting. The symptoms did not become worse, but it was ten days before any amendment began to show itself; and the recovery has been very gradual.

A boy mentioned by Zitzilius had drawn his neckcloth remarkably tight, and was whipping his top, stooping and rising alternately, when after a short time he fell down apoplectic. The neckcloth being unloosed, and blood being drawn from the jugular vein, he speedily recovered.

Dr. Abercrombie has powerfully drawn the two severer forms of pure apoplexy.

In one form the patient falls down deprived of sense or motion, and lies like a person in a deep sleep; his face flushed, his breathing stertorous, his pulse full and not frequent, sometimes below the natural standard. In this state of profound stupor the patient may die after various intervals, from a few minutes to several days; or he may recover perfectly without any bad consequences of the attack remaining. Such a seizure may take place suddenly, or after premonitory confusion of thought, imperfect articulation and deglutition, sense of weight, fulness, or beating in the head, and of flashes of light before the eyes. It may be unattended with other symptoms, or palsy and convulsions may be present in addition.

In the other, the disease begins with a sudden attack of pain in the head, the patient becomes giddy, sick, and faint, often with slight convulsions: the face is pale, the body cold, the pulse feeble. In a few minutes he recovers; but the pain remains, and after an interval of a few minutes or several hours, he becomes oppressed, forgetful, incoherent, and then sinks into coma, from which he never recovers. Palsy and convulsions may or may not be present.

The appearances which are found upon inspection after apoplexy, are of three kinds: *a.* A natural state of the brain: *b.* Serous effusion into the ventricles or upon the surface of the brain: *c.* Rupture of vessels and extravasation of blood.

a. A man, aged fifty-four, of a plethoric habit and short-necked, was admitted into the clinical ward of the Edinburgh Infirmary under the care of Dr. Duncan on the 31st of May. He was in a state of nearly perfect coma, speechless, and with palsy of the right side to such an extent that even the intercostal muscles of that side did not act. The leg and arm of the left side were occasionally affected with convulsive motions. Breathing stertorous, deglutition much impaired, pulse 74. The affection was of three days' standing, and had come on with vertigo, loss of vision, violent headach, and vomiting.

All the usual remedies were employed in the most judicious and active manner without benefit; on the 1st of June there seemed to be a slight return of intelligence, but he soon relapsed into coma, and died on the 3d without any change of symptoms.

A most minute and careful examination was made of the brain, without discovering any appearance of disease, except that the choroid plexus seemed rather darker than usual, and the basilar artery was diseased at one spot. By the side of the artery, there was a spot of the cerebral substance, no larger than a barley-corn, which appeared somewhat softened, but even this Dr. Duncan considered as extremely doubtful.—*Abercrombie.*

b. A gentleman, aged seventy, of a florid complexion, but rather infirm in his limbs, had suffered repeated attacks of loss of recollection, which were said by his family to resemble fainting fits. At the commencement of the illness, of which he died, he fell down suddenly deprived of sense and motion. After some time he recovered from this state of perfect insensibility, but his speech was now inarticulate; he had lost the power of his limbs, and his right eye was distorted outward. He was then confined to bed; at times incoherent, at other times more distinct, but always much oppressed, bordering upon coma; his speech continued very inarticulate, and his pulse was generally about 100. His strength sank gradually without any particular change in the symptoms; and he died at the end of five weeks. The ventricles of the brain were found distended with colourless fluid, and there was a considerable quantity under the arachnoid. There was no other morbid appearance.—*Abercrombie.*

c. A gentleman aged eighteen, previously in good health, after using rather violent exercise in the forenoon, had returned home before dinner, and was sitting near the fire, when without any warning, he started up, pushed his chair backwards with violence, exclaimed, "Oh, my head!" and instantly fell on the floor insensible and slightly convulsed. Dr. Abercrombie saw him within ten or fifteen minutes after the attack. By that time he had recovered his recollection, was sitting on a chair, and was quite distinct. His face was extremely pale, and his whole body cold and shivering: he complained of severe headach, and his pulse was weak and rather frequent. Blood-letting was immediately employed, and his pulse improved under it. It was repeated after a few hours with the addition of purgatives, and the other usual remedies. The coldness and paleness went off after some time, and he then complained only of severe headach, with a feeling of stiffness of his neck, and pain extending downwards along the cervical vertebræ; his pulse was rather frequent and of good strength. He continued in this state for two days, the headach varying very much in degree, and frequently complained chiefly of his neck: his pulse was frequent, 120 or more, and of good strength; the other functions were natural; he was quite distinct; had the use of all his limbs, and could get out of bed with little assistance, and sit up for a considerable time.

On the third day he began to be more oppressed, and a little confused and forgetful; the other symptoms as before. On the fourth he sunk very gradually into coma, and died on the 5th. His pulse had continued from 120 to 140: there had been no paralytic symptoms; but on the fifth day there was repeated convulsion. Blood-letting and all the other usual remedies had been employed without benefit.

All the ventricles of the brain were completely filled with coagulated blood. In the substance of the left hemisphere there was a cavity formed by laceration of the cerebral substance filled also by the coagulum, and communicating with the ventricle : there was no other morbid appearance. —*Abercrombie.*

The cases, which have been detailed, if they exemplify the features of apoplexy, exemplify no less the extreme difficulty of assigning their physical cause. In cases of sanguineous, or serous effusion, it appears natural to consider the mechanical pressure as the cause of stupor. But the stupor is often slow in coming on, and often does not manifest itself till some time after the effusion has taken place; nor is it necessarily permanent, although the effusion remains : for it may be temporarily relieved by bleeding, or without any apparent cause gradually wears off. And, if it would not encumber this volume by too many illustrations, cases might be adduced, in which large extravasations of blood have existed without any degree of coma ; and still more numerous and striking cases of enormous accumulation of water in the heads of adults, without a single apoplectic symptom. The extravasation, or pressure of effused fluid, where it exists in apoplexy, is probably therefore a part only of the physical cause of coma; something there must be in addition, some change either in the condition of the nervous substance, or in the cerebral circulation, that is brought on by, although, as in the first instance quoted, capable of existing independently of, any effusion, to constitute the immediate cause of the mental oppression.

The symptoms of apoplexy bear, if not a certain, at all events the most definite relation to the organic lesion, when they flow from sudden extravasation of blood. In the third of the cases last cited, the inward sensation attending the giving way of the vessel and first burst of hemorrhage, and the subsequent invasion of coma, were so decisive of the nature of the attack, that its origin could not have been mistaken during life.

It is possible even to distinguish when the effusion is upon the surface of the brain, in contradistinction from the cases in which it is confined to the medullary substance, and to the cavities of the ventricles. In the former case it is uniformly characterized by the attendance of convulsions.

A man, aged about thirty-five, keeper of a tavern, and addicted to the constant use of ardent spirits, had been drinking to intoxication during the night betwixt the 12th and 13th July, 1816; and, about seven o'clock in the morning, was found lying in a state of violent convulsion. No account could be obtained of his previous state, except that during the evening he had drunk a very large quantity of whisky, and that when he was last seen, about three o'clock in the morning, he was walking about his house, but unable to speak. He was seen by Dr. Hunter at a quarter before eight. He was then lying on his left side, in a state of perfect insensibility, with laborious breathing; saliva was flowing from his mouth; his eyes were much suffused, and greatly distorted,—the cornea of both being completely concealed below the upper eyelid; pulse 120, full and soft. While Dr. Hunter stood by him, he was again seized with convulsions; it began in the muscles of the jaw, which was drawn from side to side with great violence, producing a loud jarring sound from the grinding of the teeth. The spasms then extended to the body and extremities, which were first thrown into a state of violent extension and then convulsed for one or two minutes; they then subsided, and left him as before in a state of perfect insensibility. Similar attacks took place four times while Dr. Hunter remained in the house, which was about half an hour; and he expired in another attack of the same kind about ten minutes after. Blood-letting, and every other remedy that the time admitted of, were employed in the most judicious manner.

Inspection.—On removing the skull-cap an appearance was observed on the surface of the dura mater, of coagulated blood in small detached portions. These appeared to have been discharged from small glandular-looking elevations on the outer surface of the dura mater, which were very vascular, and highly gorged with blood. There were depressions on the inner surface of the bone, which corresponded with these bodies. On raising the dura mater, there came into view a coagulum of blood, covering and completely concealing the right hemisphere of the brain; it was about two lines in thickness over the middle lobe, and became gradually thinner as it spread over the anterior and posterior lobes, and dipped down below the base of the brain. The coagulum being removed, measured about ℥v. On the surface of the left hemisphere, the veins were turgid with blood; on the surface of the right, they were entirely empty; but the source of the hemorrhage could not be discovered. There was no fluid in the ventricles, and no other disease was discovered. The stomach being carefully examined, was found to contain nothing but air and some healthy mucus.—*Abercrombie.*

It is remarked that effusion in the cerebellum, or near the base of the skull, is more certainly and rapidly fatal than in the upper parts of the enkephalon.

A woman, aged about seventy, a midwife, of a full habit and short stature, while sitting by the bed of a lady whom she was attending, suddenly exclaimed, "I am gone!" and almost immediately fell down in a state of coma, with some vomiting. She lay in a comatose state, without any change in the symptoms for forty hours, and then died.

A coagulum of blood, the size of a pigeon's egg, was found in the right lobe of the cerebellum. There was no other morbid appearance.—*Abercrombie.*

A private in the 10th hussars, of a spare habit, about a month before his death was attacked with a pain in the back of his head, for which a blister was applied, and the pain soon went off. On the 22d July, 1819, he was seized with giddiness and fell down; on being raised he vomited, and complained of violent headach and faintness, but was quite sensible; he was very pale, and his pulse was slow and languid. Being carried to the hospital, he continued in the same state; asked for cold water, which he swallowed, and seemed relieved of the faintness, but continued very pale. In a few minutes his eyes became fixed; he drew deep inspirations, and in two minutes more was dead. From the moment of seizure, he did not move either the upper or lower extremities.

Nothing unusual was discovered in the brain. On raising the tentorium, the vessels of the cerebellum appeared very turgid. On removing the cerebellum, a coagulum of blood of about two ounces was found under it, and surrounding the foramen magnum.—*Abercrombie.*

Some symptoms have been described as precursors of, or attendant on apoplexy, which deserve independent consideration. These are headach, vertigo, vomiting. There are cases, in which the disease being certainly cerebral, these symptoms predominate over the strictly apoplectic symptoms; and there is a singular alliance between them, when proceeding from any cause, which it is interesting to investigate.

Vertigo depending upon Cerebral Congestion.

Wepfer mentions the case of a woman, who was recovered after hanging by frequent bleeding: she was for some time afterwards affected with vertigo, which subsided gradually.

Headach, Vomiting, Instability, depending upon the Softening of the Brain.

A gentleman, ætat. twenty-six, of a plethoric habit, had suffered occasionally for two or three years from headach and vertigo, which were always relieved by depletion. On 12th April 1827, while walking out, he was seized with confusion and giddiness, embarrassed speech, and a considerable degree of paralysis of the right leg. He was rather pale; his pulse was 70 and soft; and he did not complain of any headach. The usual treatment was adopted with activity by Dr. Combe of Leith, without much relief. On the contrary, after several days he began to complain of acute headach, accompanied by vomiting and hiccup; and the other symptoms continued nearly as before,—his speech being laboured and slow, and his memory very defective. After some weeks those symptoms subsided, so that he was able to walk out; but the headach continued with frequent vomiting. The pain was chiefly referred to the left side of the head, sometimes to the occiput, and there was occasional numbness of the right arm. When Dr. Abercrombie saw him, along with Dr. Combe and Dr. Kelly in July, his chief complaint was of frequent and irregular attacks of vomiting, occurring daily, or repeatedly during the day. It came on very suddenly, without previous nausea, and he was often awakened in the night by the sudden attack of vomiting. He had now a pale sickly look; there was no paralytic affection, and little complaint of headach; though he still had occasional uneasiness in the head, sometimes referred to one part of it and sometimes to another. When he did refer it to a particular part as the principal seat of the pain, it was either the left temple or the occiput. But the headach at this time was slight and transient, and the symptoms in the stomach were so much the more prominent, that it was a matter of much doubt whether there was now any fixed disease in the head. The vomiting was much relieved by the oxyd of bismuth, so that he was free from it several days. But it soon returned and went on as before, with increasing debility, great listlessness, and bad appetite; pulse little affected. He had now a peculiar unsteadiness of his limbs, so that on first getting up into a standing posture, he staggered very much, and required some time and attention to steady himself. When he had accomplished this he walked with tolerable firmness. The symptoms went on in this manner till the 27th of October, when he was suddenly seized with violent and continued convulsions, and died in nine hours.

Inspection.—In the substance of the middle lobe of the left hemisphere of the brain, about the level of the lateral ventricle, there was a portion in a state of complete ramollissement, about an inch and a half in length, and an inch in its other dimensions, and the neighbouring parts appeared unusually vascular. The tuber annulare and pons Varolii were softer than usual, but otherwise healthy. No other morbid appearance could be discovered in the head, and all the other viscera were healthy.—*Abercrombie.*

Headach, ending fatally, allied to Apoplexy.

Tissot mentions a woman, who, after complaining for some time of headach, was attacked with a great and sudden increase of pain, accompanied by loss of sleep, and died in a short time. On dissection no morbid appearance could be detected. A young woman, mentioned by the same writer, having, during the flow of the menses, suffered from a fright, the discharge stopped, and she became liable to frequent leipothymia. After suffering from this and various other symptoms for several months, she fell into a profound sleep, from which nothing could rouse her; this continued four days; she then came out of it and appeared to be recovering, when, after several days, she was seized with severe headach, anxiety, and convulsions, and died. No morbid appearance could be detected in any of the viscera.

In the cases last quoted (curiously analogous to simple apoplexy), the headach was not connected with any sensible cerebral lesion, or alteration in the state of the circulation. We may, however, reach to a further point still in this path of inquiry. Headach alone, or with giddiness, is liable to be produced by a condition of the brain the most remote from that congestive state, which is the common attendant of apoplexy. When much blood has been lost, the balance in the cerebral circulation between the quantity and force of the arterial and venous circulation is disturbed, and the impetus of the arterial circulation seems to produce the symptoms which are referred to: in other instances they may rather be referred to simple nervous cerebral exhaustion.

The following cases and observations from Dr. Abercrombie, are replete with pathological and practical value.

A gentleman, ætat. about forty, had been for some time losing considerable quantities of blood by arterial hemorrhage from the rectum. Considering it as merely hemorrhoidal, he had paid little attention to it, until his friends became alarmed by his altered appearance. From being strong and rather plethoric, he had become weak, exhausted, pale, and haggard. He had anasarca of his legs, his pulse was frequent and feeble, and much excited by the least exertion. Along with these symptoms, he was liable to strong and irregular action of the heart, and complained of giddiness, tinnitus aurium, violent throbbing in the head, and frequently of throbbing headach. On examining his rectum, a fungous tumour was found within the sphincter, on the apex of which a small artery was bleeding *per saltum.* This was tied, and there was no return of the hemorrhage; and under the use of nourishing diet, and a liberal allowance of wine, all his other complaints disappeared. He made up so rapidly in flesh and blood, that not long after, apprehensions were entertained that he was becoming too plethoric, and it became necessary to reduce his regimen; but under these circumstances he had no return of the symptoms in his head.

A lady, ætat. twenty-five, had been frequently bled on account of symptoms in the head which had supervened upon an injury. Considerable relief had followed each bleeding; but the symptoms had soon returned, so as to lead to a repetition of the bleeding at short intervals, and this had been going on for several months. When Dr. Abercrombie saw her, she was stretched upon a couch, her face of the most death-like paleness, or rather of the paleness of a stucco figure, her pulse very rapid and as small as a thread, her general weakness extreme. The mass of blood appeared to be reduced to the lowest point that was compatible with life, but she still complained of frequent headach, violent throbbing in the head, confusion and giddiness. It was evident that evacuations could be carried no farther, and, in consultation with a very intelligent medical man who had the charge of her, it was agreed as a last experiment to make trial of the opposite system, nourishing diet and tonics. In a fortnight she was restored to very tolerable health.

"I have been repeatedly consulted under the following circumstances. A gentleman accustomed to very full living, is seized with an apoplectic attack, or with symptoms indicating the most urgent danger of apoplexy; he is saved by bleeding and other free evacuations, and is kept for some time upon a very spare diet. His complaints are relieved; and as long as he keeps quietly at home, he goes on without any uneasy feeling. But when he begins to go abroad, he becomes liable to attacks of giddiness and confusion, generally accompanied by palpitation of the heart, and an uneasy feeling about the præcordia. His pulse is now soft and rather weak, and his general appearance indicates the very reverse of plethora; and these symptoms are removed by a cautious improvement of his regimen. This curious fact I have repeatedly had occasion to attend to in the treatment of cases of this kind, and it has always appeared to me to be one of very great interest in reference to the pathology of the brain.

"Various other facts will present themselves to the practical physician, which bear upon this curious subject. In the last stage of diseases of exhaustion, patients frequently fall into a state resembling coma, a considerable time before death, and while the pulse can still be felt distinctly; and I have many times seen children lie for a day or two in this kind of stupor, and recover under the use of wine and nourishment."

In the following case the symptoms experienced have probably been the result of cerebral exhaustion joined to derangement of stomach.

A gentleman, between his thirty-fifth and fortieth years, of a temperament inclining to nervous, but stout and muscular, habitually taking considerable exercise, and living heartily, and engaged in an active profession, has experienced, on different occasions, when exhausted by days of previous fatigue, the following attacks. After partaking early of a hearty breakfast, and travelling twenty miles, he was seized with vertigo, and inability to stand, and slight nausea: he took two glasses of brandy without any effect; but became relieved upon producing vomiting, by means of salt and water, and lying perfectly still. On another occasion he awoke in the night, low, depressed, shivering violently, with a sense of failing power, like apparent dissolution; this was relieved by applying hot bottles to the feet, and administering brandy. On another occasion, when exhausted by over-exertion, he was taken with a sense of feebleness joined to imperfect vision; in which, at first, he could see only the objects to which the optic axes were immediately directed; in half an hour afterwards, this was changed to vision of the half of objects: with quiet and stimulants, in another half hour these sensations wore off. These seizures were followed by slight headach. He is now in perfect health; but feels on going through much excitement or exertion, that he might bring on a return of the feelings described.

The alliance between vertigo and sickness is remarkable. In injuries and diseases of the head, these feelings perpetually accompany each other; and there are curious instances which even go to show that the one has a necessary connection with the other. In persons sick at sea, it is very certain that the shifting motion of visible objects, and the instability and want of support felt, or, in other words, the disturbance of the sense of equilibrium, and the giddiness so produced, are the causes of the sea sickness. If a person on shipboard, with feelings of nausea coming on, lie down and close his eyes, the nausea is wonderfully diminished; yet the only difference which he has made, is excluding impressions which favour the production of giddiness. When a person has drank immoderately of wine, on the contrary, if he shuts his eyes he experiences a strong vertigo or sense of whirling, followed by nausea; but if, instead of giving way to this sensation, he fixes his sight on a stationary object near him, the vertigo is corrected by the steadiness of the visible object; and as the vertigo disappears, the nausea wears off. The mitigation of the nausea is in both of these dissimilar instances the effect of getting rid of the vertigo.

§ II. — *Of Palsy.*

Palsy, from a single lesion of the brain, affects one side of the body only; the proper term for this disease is therefore hemiplegia.

Hemiplegia is either general or partial; that is, it invades either the whole, or part only, of the side attacked. Hemiplegia is alternating, when it invades one side of the face, and the opposite side of the trunk and limbs.

Hemiplegia is either paralytic, anæsthetic, or complete; that is, it may extinguish either voluntary motion alone, or sensation alone, or both at once. Hemiplegia, again, is either perfect or imperfect; that is, it may either suppress or only weaken voluntary power and sensation.

The following cases will serve to exemplify the principal varieties of hemiplegia. I have selected such as were to a considerable degree unconnected with apoplectic symptoms, to the relation of which with palsy I shall afterwards advert.

Paralytic hemiplegia of the face. — A gentleman, aged forty-six, after suffering pain above the right eyebrow, was taken with confusion of thought and staggering: his face was flushed, and shortly afterwards was drawn to the right side. With proper treatment he entirely recovered.

Paralytic hemiplegia of the face and arm. — A gentleman, aged eighty, who had experienced, in May 1834, an attack of confusion of thought and drowsiness, was taken in December last with palsy of the right side of the face and right arm. His mind had not completely recovered from the former attack, but did not appear to suffer through the present. He again slept a great deal. The pulse was more frequent than natural, weak, irregular, and unequal. There was considerable difficulty in deglutition and in articulating. The right leg was not paralytic, but it was cold, the left having a natural heat. There was no pain of the head. I ordered a blister to the back of the neck, and opening medicine. For the two following days there was no change; but it was observed, that each evening a slight flushing of the countenance took place. I therefore applied six leeches to the right temple, watching the effect of the small abstraction of blood: it evidently did harm; the pulse became feebler and thready. The remaining treatment was nutritive diet, and occasional opening medicine. The patient recovered the use of the arm completely, and there are hardly any remains upon his countenance of the palsy.

General Paralytic Hemiplegia.

"A gentleman, aged sixty, had been liable, for two years before his death, to attacks of giddiness, accompanied by complete loss of all muscular power, in which, if not prevented, he fell to the ground. In these attacks he did not lose his recollection, and he recovered completely in a few minutes. Before the commencement of this complaint, he had been liable to severe pain in the head, and giddiness, the attacks of which generally went off with vomiting. He was sound in his mind, but had considerably fallen off in flesh and strength: he felt an unsteadiness in walking, which made him afraid of going alone; and, for some months before his death, he had perceived an increasing weakness of both his lower extremities. On the 1st of August, 1816, he was attacked with hemiplegia of the left side, accompanied by headach and giddiness; the pulse was natural, and his mind was not affected. For four days he continued to be affected with the most complete hemiplegia: he then began to recover a little motion of the parts, and about the 15th was able to raise his arm to his head, and to walk a little with assistance: he still complained of giddiness, and noise in his ears, but had little headach. Bloodletting and the other usual remedies had been employed. On the 19th, there was considerable headach; on the 20th, he became incoherent; and on the 21st, fell into perfect coma, with some convulsion. On the 22d, he was considerably recovered, so as to know those about him, and to answer questions rationally; but at night he relapsed into coma, and died on the 23d. For the last three days his pulse had been from 112 to 120.

"*Inspection.* — Along the upper part of the right hemisphere of the brain there lay a remarkable tumour five and a half inches long, two and a half broad, and about half an inch in thickness; it was formed by a separation of the laminæ of the dura mater, and a deposition of new matter betwixt them, This new matter was, at the posterior part, white and firm; in other places, especially about the centre of the tumour, it was more like recent coagulable lymph, firm, yellow, and semi-transparent; and, at the anterior part, there was a cavity containing yellowish serous fluid. The tumour lay from before backwards along the upper part of the hemisphere,—the inner edge of it being about an inch from the falx; the dura mater all around it was considerably thickened, as were also the coats of the longitudinal sinus. The surface of the brain, where the tumour lay, was depressed so as to retain an impression of its figure; and, on the anterior part of the brain, the substance was considerably softened, with some appearance of suppuration. There was very little serous effusion, and no disease in any other part of the brain."—*Abercrombie.*

Anæsthetic Hemiplegia of the left side of the Body, with Paralysis of the right side of the Face.

Thomas Embury, ætat. forty-two, one morning after breakfast, now seven weeks ago, on stooping to open a plate-chest which had been made of green wood, and kept closed some time, was so powerfully affected by the close smell which issued from it (such is his account), as to fall backwards, but without losing his senses, or striking his head. On recovering, he found he had undergone a paralytic seizure: the left side of the face and head and body and limbs were numb; the left arm more so than the left leg: he believes that no muscular weakness of the left side was combined with the anæsthesia; but the leg he thinks dragged a little during the next two or three days. In four or five days, however, the leg, whether paralysed at first or not, had recovered both strength and feeling. The arm has been slower in recovering feeling; and even now the little finger and ulnar edge of the hand and forearm are in a degree numb. The sensibility of the left side of the face is entirely returned. What may have been the state of the right side of the face on the day of the seizure he does not know; but the following morning he observed that it was paralyzed: he could not close the right eyelid; the mouth was drawn to the left side; the sensibility of the right side was unimpaired. The first day he had some difficulty in swallowing; and for three or four days his speech was thick and imperfect. After a few days he felt a pain, for an extent which a shilling would cover, deep-seated on the right temple, midway between the eye and upper part of the ear. This pain has continued, though now considerably mitigated, to the present time. He has occasionally confusion of thought. He experiences at times sensations like life-blood in the arm and legs, but no spasm. The right eye is weak, but not inflamed: when it is unclosed, he sees double, owing to a slight deviation of the right optic axis outwards. [July, 1835.]

Hemiplegia is found to be produced by any variety of cerebral lesion, from slight serous effusion, or inflammatory softening, to tumours or thickening of the membranes, or masses of extravasated blood. The proximate cause, therefore, of this affection is if possible in still greater ambiguity than that of apoplexy. At the same time, I think it is possible to explain (passing over the question, what is the physical cause of hemiplegia) many of the phenomena of the disease, the nature of which has hitherto been thought obscure.

The most remarkable phenomena in hemiplegia are the following:—Disease of one hemisphere of the cerebrum or cerebellum produces hemiplegia of the opposite side of the body:—in general hemiplegia the palsy of the leg is less complete, and capable of being more quickly recovered from than palsy of the arm:—in a gradual attack of hemiplegia, the weakness and numbness are first felt in the hands and feet, the parts nearest the trunk being the last affected: —paralytic hemiplegia is more frequent than anæsthetic hemiplegia.

The preliminary question to be settled is, what is the nature of the impression, which, being made by the diseased or injured brain upon the medulla oblongata and spinal marrow, produces palsy? An idea commonly entertained upon this subject is, that palsy results from the interruption of the ordinary supply of nervous stimulation furnished by the brain: this idea, however, is certainly erroneous; for, experiments made on animals, and instances of acephalous human infants that have survived their birth, abundantly show that the medulla oblongata and spinal cord are sufficient, *without the brain*, for sensation and voluntary motion. The notion that most commonly prevails perhaps is, that *pressure* on the brain is the cause of palsy: this, however, if it were true, would only shift the difficulty to another point; for it still would remain to be asked, How does cerebral pressure produce palsy? But the truth is, that in many cases of hemiplegia from cerebral disease there is no pressure: softening of a part of the brain for instance, in which there is no increase of volume, will as effectually produce palsy as an apoplectic clot. The solution of the question which I am disposed to adopt, and which I believe not to have been previously entertained, is the following: — I conjecture the immediate cause of hemiplegia to be a depressing influence or shock, originating in the brain when in certain states of lesion, and propagated from it to the medulla oblongata and spinal marrow.

It may be asked, whether it is reasonable to suppose that the brain, when in a state of lesion, *can* originate any such depressing or palsying shock? Reasoning upon analogy, it is probable that the brain *may* possess this property. It is certain, that, upon other organs than those of animal life, the brain *does* exert such disastrous and depressing influence. For example, in persons of a nervous temperament, sudden and overwhelming intelligence will sometimes temporarily stop the heart's action. Physical impressions, again, such as crushing a part of the brain or spinal marrow, will temporarily palsy the heart; an experiment the more conclusive, that the heart's action will continue undisturbed during the entire removal of the brain and spinal marrow, if the abstraction of these parts be made with gentleness. Is it surprising that lesion of the brain, which can palsy the heart, the action of which is not derived from the nervous system, should throw palsy upon the voluntary muscles, that in so many ways are habitually influenced through it? Such a force of depression, similar in kind, although much less in degree, mental affections alone have the direct power of temporarily producing: the "genua labant, tremor occupat artus," the weakness of terror, is probably an instance of imperfect or temporary palsy so produced.

Upon these and other grounds, which will be presently mentioned, it appears reasonable to believe that a lesion of the brain is capable of originating a depressing force, which can strike with palsy the organs in the cord from which the nerves arise; or that palsy from cerebral disease is not caused by the interruption of an accustomed stimulus, but by the production of a new and withering influence, transmitted from thence to the origins of the nerves.

I. *How does it happen that a lesion of one side of the brain invariably produces palsy of the opposite side of the body?*

The entire analogy of the nervous system leads us to suppose, that the influences which pervade it move in the direction of the threads or filaments of which the medullary substance is composed. Anatomists therefore look with curious interest to the construction of the enkephalon, in the expectation of discovering some transposition or crossing over of nervous filaments from one side to the other, through which the crossing of the depressing influence, or palsy-shock, may be supposed to be conveyed. After the most careful research, it appears that such a transposition or decussation of nervous threads is to be found in the medulla oblongata alone. Where the medulla oblongata joins the spinal marrow, the *anterior pyramids* throw their fibres downwards, in oblique decussation, each to the opposite side, in such a manner that the right anterior pyramid plunges into the centre of the left half of the spinal marrow, while the fibres of the left anterior pyramid plunge into the right half of the cord.

I concur with those who think that these decussating filaments are the channels through which the palsying influence is conveyed from a diseased cerebral hemisphere to the opposite side of the frame, upon several grounds: first, because these decussating fasciculi are the only ones which have been discovered in the enkephalon; secondly, because the position of these decussating fasciculi is exactly that which experiment and observation lead us to expect to be the place of the transposition of palsy; thirdly, because all the phenomena of hemiplegia, from lesion of the opposite side of the brain, may be explained upon this supposition; fourthly, because even the remarkable cases in which partial hemiplegia of the opposite side is combined with partial palsy on the side of the cerebral lesion, admit of a perfect explanation on the same hypothesis.

The most conclusive facts with which I am acquainted, to show that the crossing of palsy to the opposite side is effected *in the region of the medulla oblongata*, are given in a very interesting paper by Dr. Yelloly, in the second volume of the Medico-Chirurgical Transactions.

Dr. Yelloly describes an experiment upon a dog, in which Sir Astley Cooper divided the right half of the spinal marrow, at the interval between the occiput and atlas: the dog became palsied *on the injured side*. It may be inferred from this experiment, that the seat of the transmission of palsy is to be found above the atlas.

Dr. Yelloly afterwards describes a case of hemiplegia, in which it was found, after death, that a tumour, of the size of a filbert, had been imbedded in, and had made pressure upon, the right side of the annular protuberance. The hemiplegia in this case had affected the left, or *opposite side* of the body.

It may be confidently inferred from this case, that the seat of the transit of palsy is behind or below the pons Varolii; but the experiment by Sir Astley Cooper, previously mentioned, establishes that it is above the spinal cord. The two instances, taken together, render it almost certain that the place of the transit of palsy is somewhere in the medulla oblongata, or its junction with the spinal cord; and it is evident how much additional force is given to this conclusion by the fact previously mentioned, that no decussation of nervous filaments has been found, except at the latter point.

We may now inquire whether the decussation of the anter pyramids is sufficient to account for all the phenomena hemiplegia.

Will, in the first place, the course of the decussating bres account for the production of numbness, or anæsthesia, s well as of muscular palsy ; for the former, although not a constant attendant of the latter, may be combined with it, or even exist without it? Upon this question no one, who has well examined the anatomy of these parts, will entertain a doubt. The decussating fasciculi of the anterior pyramid, on plunging into the opposite column of the spinal marrow, strike into its centre, and implicate themselves nearly as much with the posterior as with the anterior fasciculi; that is to say, with the sentient as well as with the voluntary portions of the cord: so that the wonder is, not that anæsthesia should be produced through their agency, but that it should be so seldom produced, compared with the frequency of simple muscular palsy.

Again: it is evident that palsy of *all* the spinal nerves of the opposite side of the body may be sufficiently accounted for, as a consequence of lesion of the cerebrum, if the anterior pyramids be supposed to transmit the palsy-shock; for the fibres of the pyramids, which are continuous upwards, on the one hand, with the cerebral hemispheres of the same side, or with the seat of lesion on the other hand, are continued downwards into the upper part and centre of that tract, from which *the whole of the spinal nerves* are derived. But how is it possible to account for palsy of the opposite side of the face through the same channel, for palsy of the opposite side of the tongue, and of the opposite facial and auditory nerves? These phenomena may, I think, be thus explained: Where the decussating fasciculi of the anterior pyramid plunge into the opposite half of the spinal marrow, they are implicated, in a wonderful closeness of intertexture, with fibres, which, *in their upward course,* bend towards the places of origin of the ninth and seventh, and of th eighth and fifth of the palsied side. May it not be sup posed that this interlacement may be a sufficient means communicating the palsying influence to the ascendi fibres, which are in close relation to the affected cerebral nerves? Thus, the palsy-stroke transmitted to the junction of the spinal cord and medulla oblongata, might spread its influence in either direction separately, or in both together, according to laws which may possibly be hereafter rigorously determined; sometimes striking the body alone with palsy, sometimes the face, sometimes both; sometimes palsying speech, sometimes deglutition, sometimes hearing.

But the fifth nerve, why is it so rarely affected in hemiplegia? and the orbital nerves, why do they so frequently escape the palsying influence? These phenomena, it will be evident, are highly consistent with the supposition that the palsying force *strikes* exactly at the point where the decussating fibres of the anterior pyramids terminate. Supposing the paralysing impression *to be received* on this part, its force *upwards* should be weakened in proportion to the distance of each cerebral nerve from that part. But the fifth lies further off than the seventh, the third than the fifth; and something in that proportion is the infrequency of the palsy of these nerves in hemiplegia.

But if the phenomena of hemiplegia dependent upon *cerebral lesion* are thus sufficiently explained, how is the fact to be accounted for, that hemiplegia of the opposite side is produced by lesion of one hemisphere of the *cerebellum?* I have little doubt that the following explanation of the phenomenon will eventually be proved to be correct.—The fibres of the anterior pyramids pass through the pons Varolii. The pons Varolii consists in great part of filaments, which issue from each hemisphere of the cerebellum. These filaments may easily be supposed to convey a depressing influence from the diseased hemisphere; but in their course they come immediately upon the filaments of the anterior pyramid of the same side; and they are so implicated with the latter, with such a singular closeness of reticulation, and often with so much that looks like an actual interchange of filament, that it is far from unlikely that they may transmit to the descending fasciculi of the pyramid a shock, which may thence be communicated to the same part at which a cerebral lesion exerts its paralysing force.

But why does it happen that the diseased hemisphere does not strike with palsy the cerebral nerves of the same side, the fifth, the seventh, and the ninth? It is not impossible that the ninth, which rises close to the side of the pyramid, may be so affected. But the fifth and seventh are so remote from the pyramid of the same side, that it could not be expected to extend its influence to them.

But it has been mentioned that there are cases in which hemiplegia of the opposite side to the seat of cerebral affection may coexist with partial palsy of the same side; both phenomena being produced by one cerebral lesion. How are such phenomena to be brought under the same hypothesis? The following case, which is under the care of Dr. Hawkins, in the Middlesex Hospital, and is of remarkable interest, may serve at once to exemplify and to explain the apparent anomalies to which I now advert.

The patient, a female, twenty-eight years of age (I omit the symptoms of general disorder under which she has laboured), experienced, in December last, pains deeply seated in the left side of the head; she became afflicted, at the same time, with palsy of the right side of the body. Under appropriate treatment, the pain in the left side of the head has subsided, and the hemiplegia has much diminished. But another symptom supervened soon after the appearance of the hemiplegia: the sight of the left eye has become dim, the pupil is dilated, the upper eyelid has fallen, the eye is more prominent than the other, is habitually directed outwards, and can by no effort be directed inwards. It is evident, from the latter train of symptoms, that the second and third nerves of the left side have become partially palsied. Through palsy of the second, her sight is dim: through the same cause, joined with imperfect palsy of the third, the pupil is dilated; through the palsy of the third, again, the eyelid droops, the levator having feeble action; through the same cause the eye protrudes, for there is no sufficient force in the weakened recti to overcome the traction forward, which is produced by the unpalsied superior oblique. The eye is habitually turned outwards through the influence of the fourth and sixth nerves, that are unaffected; and when, by a painful effort, the eye has been slowly drawn to a central position, which the feeble action excited through the *imperfectly* palsied third can gradually effect, the contrast is remarkable of the rapidity with which it is thrown outwards, the moment the patient is desired to look in that direction.

But what is the seat of the lesion which has produced this complicated paralysis? It appears to me impossible to doubt that the disease is situated in or near the left optic thalamus; it has palsied, though not perfectly, the second and third nerves of the same side, which rise in its immediate vicinity; it has then thrown its palsying influence down the fibres of the crus cerebi to the anterior pyramid of the same side: the fibres of the pyramid having no communication with the fourth, the fifth, the sixth, the seventh, or the eighth, of the same side, these have escaped unharmed. Below their origin is the decussation, at which it is certain that the palsy-shock has been transmitted to the opposite half of the spinal cord.

What may be the nature of the disease in this case is by no means so certain as its place. Palsy follows various kinds of lesion: sanguineous effusions, softening, abscess, tumours, or pressure from substances external to the meninges of the brain, may frequently produce it. In the present instance, the gradual supervention of the symptoms renders it probable that they are caused either by softening or by the growth of a tumour*. The diminution of the hemiplegia under the treatment employed, and the increase of the palsy of the parts in the orbit, lead me to suspect the latter.

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* These remarks were made in March of the present year. The patient is now well of the hemiplegia of the right side of the body; but the left eye is protruded and its sight lost. The case, the event has shown to have been one of softening of the brain, with recovery. [August 25.]

2. *What reason can be assigned for the facts, that in general hemiplegia from cerebral lesion, the palsy of the leg is less complete, and capable of being more quickly recovered from, than the palsy of the arm?*

If the supposition, which I have advanced, be admitted, that hemiplegia results from a depressing influence transmitted from the brain to the cord through the anterior pyramids, the answer to this question is easy. The palsy-shock, if shock it be, would naturally act with most severity, where it is first delivered; that is, upon the upper part of the spinal cord, weakening with the greatest depression the voluntary powers of that part; it would naturally affect with less intensity the inferior and *remoter* part of the cord. But it is worth while to consider all the phenomena of the class together, as they are repeatedly exemplified in disease: — a slight attack of hemiplegia paralyzes the arm; — a severer, the arm and leg together, but the arm is more numb and feeble than the leg; — on recovery, the leg improves before and faster than the arm, and is often perfectly restored, when the arm is yet feeble: — on the other hand, if the attack from a slight one becomes more severe, it is first the arm which is taken (generally together with the face), and as the arm gets worse, the leg gradually becomes attacked. These striking facts may be used in two ways; either they may be explained upon the theory of the palsy-shock which I have advanced, supposing it otherwise established; or that theory remaining in doubt, they may be adduced in proof of its validity.

3. *Why, in a slow attack of palsy, are the muscular weakness and the numbness first felt in the extremity of the affected limb? Why in the hand before the fore arm, — in the fore arm before the upper arm?*

In this instance it may be presumed that a diminution of the usual quantity of stimulus or energy, transmitted along the nerves from the organs in which they rise, is the cause of the effect observed. A part of the cord is smitten with an imperfect palsy-stroke: it cannot energize as before, or throw along the nerves which arise from it the usual quantity of nervous force. Upon this supposition it would follow, that the defect of stimulus should first become sensible at the extremity of a limb. The weakened segment of the cord might be expected to be unable to throw out energy enough to fill a long nerve, while it yet might supply with adequate force of stimulation the shorter nerves of the portion of the limb nearer the trunk. The fact presents a remarkable contrast with the last class of facts adverted to, and shows at all events that the two are not referable to one principle. In slow hemiplegia, the arm is struck before the leg; but the hand is struck before the arm.

4. *How is it to be accounted for that muscular palsy is more frequent than anæsthesia?*

The reason may be this: The office of the sentient nerves is probably an easier function than that of the motor nerves. In some experiments which I made upon the mode and quickness of reparation of both classes of nerves after their division, I found that the sentient nerves resumed their functions in a shorter time than the voluntary nerves. I divided the facial branches of the seventh and of the fifth nerves on one side in a cat: in the third week sensation had returned, but no sign of returning motion appeared till after the fourth. If this principle be true, it will solve the present question. The sentient nerves, it would appear, require a harder blow to palsy them than the voluntary. It deserves besides to be pointed out, that, as the office of the former is to transmit towards the centre, not from the centre, it is natural to expect that they would be less susceptible of a force proceeding against the habitual course of these motions. The connection of the decussating fibres of the pyramid with the posterior part of the opposite half of the spinal cord, is likewise not *quite* as extensive as with the anterior.

The relation of palsy to apoplexy is close and remarkable. Rupture of vessels with extravasation (no less than serous effusion), produce each of these seizures indifferently, singly or together. It appears, however, that as a general rule, palsy after rupture of vessels is the consequence of a lesser effusion ıan apoplexy. Or the cause which produces palsy is a lesser esion than that which produces apoplexy. Accordingly, it occasionally happens, when bleeding is employed in simple apoplexy, and the mental oppression becomes sensibly less the cerebral circulation being relieved, that at the same instant hemiplegia developes itself. It is, indeed, difficult not to pause upon this fact, and to take a different view, and to question the absolute expediency of large abstractions of blood in apoplexy; it is certain that bleeding cannot remedy palsy; is it possible, that by disturbing the circulation, when the brain is recovering from the apoplectic shock, it may promote its occurrence?

A middle conclusion may be safely adopted; bleeding is not to be employed as a practice of routine, but only when rendered imperative by peculiar features in the attack. The following case will serve to show its temporary usefulness even in a desperate case; it exemplifies likewise another curious and unexplained feature of the gravest and most complicated apoplexy, — the occurrence of convulsions *on the same side* with the cerebral lesion, in conjunction with palsy of the opposite.

W. Tucker, ætat. forty-two, brought into the Middlesex Hospital, and supposed to be intoxicated: he was drowsy, heavy, stupid, not insensible, answered some questions; the pulse small and slow. The left arm and leg powerless, face drawn to right side. When put to bed, he was seized with rigor, and complained of pain in the right side of occiput: in an hour afterwards the pulse rose, and the right side of the body became convulsed: v. s. ℥xviij: the convulsions ceased for a time, then returned with extreme violence threatening to suffocate him: v. s. ℥xl: the respiration became more free, but the convulsions remained: he then became comatose. He continued insensible during the night, the breathing stertorous, right pupil dilated, left contracted, no pulse at the wrist: he died at 11 A. M.

A large cavity filled with blood, partly clotted, occupied the centre of the right hemisphere of the brain: it did no communicate with the lateral ventricle, but opened betwee the sulci of the convolutions, which for a large extent were lined with it; between their summits streaks of clotted blood lay, resembling veins.

There was slight sanguineous effusion on the surface of the anterior lobe of the left hemisphere. *It is possible, but very unlikely, that this may have caused the convulsions of the right side of the body.*

§ III. — *Of Epilepsy.*

In the immense digest of scientific and practical observations on cerebral disease, with which Dr. Bright has enriched English medical literature, no subject is treated more luminously and instructively than that of epilepsy. To convey an idea of the general features of this disease, I cannot do better than extract the following graphic account from the volumes to which I refer.

"The first paroxysms of epilepsy very frequently occur during the night; and when accidentally discovered, it is quite uncertain whether something of the kind may not have taken place before, and passed unobserved.—The first fit often comes without a warning, and if it do not occur in the night, sometimes takes place with most inconceivable suddenness: the patient, while dressing himself in apparent health, falls to the floor senseless: or, in the very act of putting a morsel into his mouth, loses his recollection, and is stretched convulsed upon the ground; while at other times the first attacks are of the slightest character.

"It sometimes happens, though comparatively seldom, that a single paroxysm occurs, and is never repeated during life; somewhat more frequently the paroxysm is repeated at very long intervals, several years intervening between the attacks; still more frequently the fits return at irregular intervals of a few months or a few weeks; sometimes they observe nearly regular periods; sometimes they return daily or nightly; and I have known twenty, thirty, or more renewals of the paroxysm within twenty-four hours. This variety in the frequency of repetition depends occasionally on explicable causes, but is often totally unaccountable; when each night brings back the fit, we naturally account for it by the congestion attendant on the state of age; where in females the fit observes a monthly period, we trace it often to nervous irritation in sympathy with the uterus; and when long periods have intervened, we may usually trace each distant paroxysm to the repetition of some excess, or to a neglected state of the bowels; but where it occurs less regularly, we often seek in vain for a probable exciting or favouring cause.

"The phenomena preceding, accompanying, and subsequent to each paroxysm, present a wide variety. In some, the fit is immediate, without the slightest warning: in other cases, previously to a fit we find a considerable influence exerted over the whole disposition of the mind: in some instances an unusual flow of spirits for a day or two is the constant forerunner of the attack; in others, a depressed, almost a sullen state of mind mark the approach of a paroxysm: sometimes an unusual drowsiness is the precursor of the fit. In some cases certain feelings are experienced, which at once give the alarm,—a tingling, or slight spasmodic action of the muscles,—sensations, which the patient often calls "a working:" this may continue for a whole day or more, and may even subside without the fit coming on; or it may scarcely afford time for the patient to prepare the attendants for the threatened event. At other times a very peculiar sensation, not unlike a creeping or a cold air passing over the skin, is felt in some distant part of the body, as the hand or the foot, or a single finger, and this seems to advance by quicker or slower steps towards the head, sometimes affecting the cheek, and then the violence of the paroxysm often comes on, but it sometimes even then again subsides.

"The character of the fit itself varies as much as the premonitory symptoms; often, it is simply a momentary absence of mind, the eye fixed as in thought, yet gazing vacantly, no convulsion, no sound, the occupation of the hand ceases, while the mind for a moment is annihilated; the cloud passes off, the intellect returns, and often, unconscious that its operation has been suspended, the patient resumes the occupation in which he was engaged. At other times, this loss of mind is concomitant with a slight appearance of convulsive or involuntary action: the fingers, generally of one hand, sometimes of both, are moved irregularly and without object: the eyes are rolled from side to side, or drawn under the eyelids, or some catching motion is seen in the muscles of the face.—In other cases, again, the convulsion is more obvious: the head is drawn towards one side, and the hand sometimes follows in such a way, that at first it appears to be seeking something towards which the eyes are directed. This may be the whole fit, but more commonly is only the commencement of a much more violent and appalling paroxysm, in which the whole frame is agitated, drawn together, and thrown into tremendous motion, as by the excess of muscular contraction. Sometimes the fit commences by a sudden cry, uttered as the patient falls senseless to the ground, and there either lies motionless, or more frequently agitated with such powerful muscular contortions, that two or three attendants scarcely suffice to prevent his suffering injury from the objects around: the teeth are gnashed, lacerating the tongue, and the saliva, frothy with air and red with blood, flows from the mouth.

"The duration of these attacks, even in their most violent form, is often only a few minutes, seldom above half an hour, unless, as the first fit is obviously going off, a second succeeds, and in that way the paroxysms may be repeated through several hours. The paroxysm past, some few recover as if awakening from a slumber, and return at once to their former health; others suffer severe headach for a few hours; the majority become drowsy and fall into a deep sleep, or pass into that state without having recovered to consciousness after the convulsion was passed. In this state a few hours are passed, and then apparent health is restored. In some cases, however, this sleep is a death-like sopor, a state of insensibility rather than of sleep. When the paroxysm has passed away, there is very frequently not the slightest knowledge of what has happened; so that in some cases it is only from the urine having passed unconsciously, or from some other accidental circumstance, that either the or the attendants are made acquainted wi

characteristic features of epilepsy, are insensibility onvulsions. The latter symptom leads us to expect, e analogy of apoplectic cases attended with convulsion, the surface of the brain is the part immediately disor- ed. And such is frequently ascertained to be the fact. ommon causes of epilepsy are, growth inwards of the kull; thickening of the membranes of the brain; tumours pressing upon the surface of the brain, or implicating the cineritious substance.

Instead, however, of making additional extracts, I shall refer the reader to Dr. Bright's original work, for examples of what is here stated. When studying his views, the reader may be disposed to class some of the slighter cases, which I have placed in alliance with apoplexy, as partaking more of the nature of the disease now under consideration. Epilepsy, however, is itself closely allied to apoplexy; and it is often not less difficult than important, to distinguish in the combination of symptoms presented by individual cases to which character they most incline.

Epilepsy again is so nearly allied to hysteria, that it is equally difficult in other cases satisfactorily to discriminate between *these* affections. The most severe epileptic fits, which I recollect to have witnessed, were at once of uterine origin, and, singularly enough, combined with temporary hemiplegic seizures.

A woman, between thirty and forty years of age, laboured under obliteration of the canal of the vagina, that had bee caused by inflammation following a miscarriage. I believe th the cavity of the womb was obliterated likewise: at all eve there was suppression of the catamenia. It happened, that t patient had from puberty menstruated regularly every t weeks. When therefore the catamenia were suppresse disorder which thence arose, manifested itself perio at this short interval. Every three weeks this patie seized with pains in the head, which became gradual acute; after a day or two epileptic seizures too two or three or more recurring at each catamenia when the seizures were the severest, they were attended by numbness and weakness of one side of the body.

This patient for a time had the severity of these attacks much mitigated by small bleedings immediately before the expected return of the symptoms. Afterwards, with Sir Charles Clark's advice, and hoping that the operation might bring back the catamenial secretion, I divided the adherent parts, and so restored the canal of the vagina. And as I then found no opening leading into the uterus, I cut the cervix half through, and tried with a probe to find a passage; I could not, however, discover any uterine cavity, and I believe that it had closed. The suppuration from the wound for a time relieved the patient of her epileptic seizures; and I heard that she did not suffer so severely afterwards.

§ IV. — *Mental Derangement.*

Mental derangement, — whether shewn in partial delusions, or in the attaching undue and irrational importance to particular objects, or in profound melancholy and wayward impulses to extravagant actions, or in habitual suspiciousness, or in uncontrollable irritability and violence of disposition, or in indifference to moral restraints, or in total disorganization of the understanding and incoherence of thought ending in fatuity, or in several of these elements combined,—is either more a mental than a corporeal disease, or else has to do with finer shades of alteration of structure than anatomists can yet appreciate.

I think it is practically more useful to view this disease as a disease of the mind. Ample experience has shown that the most powerful effects are produced upon it through what is called moral treatment, the essence of which is,— the seclusion of the deranged person from the society of his friends, whose injudicious attempts at controlling and managing him, serve but to irritate his mind and increase his malady; — and the impression quietly conveyed to him and quietly acted on, that he is placed under restraint, for want of self-restraint in conduct, and irrational views in thought, under the influence of which he cannot be trusted to his own guidance. Quiet, and gently enforced obedience, joined with a moderate and wholesome exercise of the undiseased portions of the mind, are more important to the recovery of insane persons than all schemes of medical treatment, beyond those which common sense dictates, namely, abstemiousness in diet, bodily exercise, medicine to move the bowels if necessary, and sometimes but rarely to compose the nervous system.

On examining the brains of those who have died insane, no constant appearance is met with. When the complaint has not been of long standing, or modified by phrenitic attacks, no change at all is observed. The commonest appearance, after continued mania, is thickening of the arachnoïd; this is indicative of former vascular action, which, however, has not attended the ordinary course, but the occasional pyrexial exacerbations of the malady.

The more rare appearances, such as cysts and tumours of various kinds in the brains of maniacs, may be viewed rather as causes which have disposed the brain to the disease, rendering it unusually irritable, than as themselves the sources of it.

Or, in a brain disposed by other circumstances to insanity, it is possible that these may act as exciting causes. There are some persons strongly disposed to mania, whom fermented liquors render for the time insane; and others in whom bodily injuries produce the same effect. What is mere insanity is then liable to be mistaken for phrenitic delirium. It is perhaps in cases of injury of the head alone that this mistake is likely to be made: but in these cases the supervention of temporary mania is just uncommon enough to lead the practitioner not to expect it, while the error if acted on might prove of serious or fatal consequence.

§ V. — *Inflammatory Affections of the Brain.*

It is easy to make or to find a vigorous outline of apoplexy, palsy, and epilepsy, but the characters of inflammatory affection of the brain present such endless and important varieties, that it is hardly possible to group their features with any thing like correctness under a few decided heads.

Cases, which have been already given, exemplify the production of palsy from inflammation of the brain, when thickening of the membranes, or effusion, or softening has taken place. Convulsions, again, are, from what has been already stated, natural consequences of inflammatory action upon the surface of the brain; and coma will supervene from the excited state of the circulation alone, independently of the compression resulting from the fluids poured out. So insidious again is the progress of these disorders, that the first symptom which conveys an idea of cerebral mischief, often has one of these startling characters.

In other cases, fever, watchfulness, acute headach, impatience of light, suffusion of the eyes, and delirium, stamp a decided character on the attack.

In other cases, when the attack is masked by fever, on the subsidence of the latter, the tongue being clean, the pulse reduced in frequency, at the time when decided improvement should be noticed, in its place headach, squinting, and a disposition to coma, supervene.

It is, again, difficult to localize by symptoms the seat of cerebral inflammation.

Inflammation of the dura mater is generally characterized by less sensorial disturbance than inflammation of the deeper parts. It necessarly implicates the bone; and its existence often becomes suspected through the presence of caries evinced in the os temporis by discharge from the ear, in the ethmoïd by suppuration in the nose. In the following remarkable case, the first clear light as to the nature of the disease seems to have been thrown by the condition of the cranium.

"A lady, aged twenty-two, in the evening of 16th March 1820, was suddenly seized with severe pain in the left temple; I saw her for the first time on the following morning, when I found the pulse about 100, the tongue white and moist; some pain continued in the left temple, but it was not severe; and her whole appearance corresponded with that of mild continued fever, though with some characters of an affection of the brain. After general and topical bleeding, with purgatives, &c. she was very much relieved; she occasionally complained of pain in the head, but at other times was entirely free from it, and mentioned only a feeling of confusion. The pain when present was occasionally referred to the left temple, and at other times was more general, extending over the upper part of the head. Amid these changes the first week of the disease passed, with much of the character of continued fever; the tongue white, the pulse varying from 96 to 110, the nights sometimes quiet, and sometimes restless. In the beginning of the second week, a swelling appeared in the left upper eyelid; her look was now more oppressed, the pulse varying from 96 to 120; the pain varying as before, sometimes a good deal complained of and sometimes quite gone; and one day she complained of acute pain in the right ear. On the 27th she began to have severe shiverings, followed by heat and perspiration, for which an eminent physician ordered her the bark in large doses. For two days after this she seemed much better, the pulse from 90 to 96, and every symptom greatly relieved. The swelling on the left eyelid was punctured, and discharged a good deal of purulent matter; and a probe introduced by the opening passed to a great depth along the upper part of the orbit, where the bone in some places felt bare. On the evening of the 29th, she was seized with slight convulsion, but it soon subsided, and after it she seemed quite as well as on the two preceding days, all the previous symptoms being very much relieved. On the 30th, there was more complaint of headach, with an oppressed look, and the pulse varied exceedingly, being sometimes very rapid, and at other times little above the natural standard. On the 31st, there was no particular change; she was quite intelligent, and all her senses were entire. When she was last visited about nine o'clock at night, she complained of some uneasiness across the crown of the head, but no other change was remarked in the symptoms. Between one and two in the morning, she was observed to be slightly incoherent, and soon after sunk into a state of lowness; did not speak, but seemed quite sensible, and died at three. Very slight delirium had been observed on a preceding night, about the 28th, and once she had complained of dimness of sight, but none of these symptoms had been again taken notice of.

"*Inspection.* On raising the skull-cap a good deal of purulent matter escaped, which had been collected betwixt the bone and the dura mater. The space in which it had been contained was defined by an irregular elevated margin of adventitious membrane, by which the dura mater had adhered to the bone, the included space being about the size of a crown-piece: it was on the anterior part of the right hemisphere. The dura mater included within this space was depressed; its surface was in some places ulcerated, and in others black, but the membrane was quite entire, and the bone was sound. On raising the dura mater, the inner surface of this portion had the same irregular ulcerated appearance as the outer surface, and when held up to the light, the membrane at the part appeared to be in some places considerably thickened, in others very thin. The right hemisphere of the brain, over all that part of it which is usually exposed in the ordinary way of opening the head, was covered by a thin uniform layer of very thick purulent matter, spread over it with great equality, and this being removed, an extensive stratum of adventitious membrane was found under the arachnoïd. It was irregular in thickness, being most remarkable on the anterior part of the hemisphere, and disappearing on the posterior part. It followed the course of the arachnoïd, covering the openings of the convolutions, but not dipping between them. The pia mater betwixt the convolutions was highly vascular, but without any deposition. On cutting into the substance of the right hemisphere, the cerebral matter was to a slight depth of a dark livid colour, but without any change of structure. There was no effusion in the ventricles, and the brain in all other respects was quite healthy. The suppuration in the left orbit was confined to a cavity betwixt the orbit and the ball of the eye, without any disease of the bones, and without any internal disease on that side of the cranium." — *Abercrombie.*

The following case exemplifies extensive inflammation of the arachnoïd and pia mater; it is remarkable for the exclusive locality of the disease, and the obscurity of the symptoms.

"A child, aged between three and four, had scarlatina mildly in the middle of June 1824, having been confined only four or

s. He had been down stairs for several days, and
twice out of doors; when, on the evening of the 23d,
ame feverish, and complained of his bowels. After
eration of some laxative medicine he was much relieved
e 24th; his pulse, however, continued frequent. On
25th, he again complained of his bowels, and was
erish; but in the evening he was again relieved, and no
nptom was remarked, except that his pulse continued
ghtly frequent, and at one time he complained of uneasi-
ess in his eyes. In the night he was restless, but still
complained only of his belly; his bowels had been freely
moved, and the motions were natural. On the 26th, he had
frequent vomiting, and in the evening became oppressed;
pulse 120. I saw him for the first time at night. He was
then in a state of oppression, evidently verging towards
coma; could be roused, but without taking much notice of
objects; pulse 120; countenance and eye natural. Topical
bleeding, purgatives, cold applications, &c. were employed.
In the night there was frequent vomiting, every medicine
being brought up, and the bowels were not moved. On the
27th, the coma was increased, and there were through the
day frequent convulsive affections of the face and arms;
pulse 120, and weak; pupil dilated, and the eye insensible;
died early in the morning of the 28th.

“*Inspection.*—On removing the dura mater, the whole
surface of the brain was found to be covered by a continued
stratum of yellow adventitious membrane, deposited betwixt
the arachnoïd and pia mater. It was thickest above the
openings betwixt the convolutions; in many places, it was
traced dipping betwixt them to the depth of half an inch;
and in some places, on the right side of the brain, it followed the
course of the pia mater through the whole depth of the con-
volutions. The deposition was general over the whole brain,
and on the upper and anterior parts of the cerebellum; an
there was a good deal of it about the optic nerves. The p
mater and the arachnoïd adhered everywhere very firm
together by means of it; when they were separated,
arachnoïd presented no unusual appearance, but the
mater showed throughout the highest degree of vascula

the deposition was entirely confined to the space betwixt the membranes, for no vestige of it could be traced either on the outer surface of the arachnoïd or the inner surface of the pia mater. There was no serous effusion, and the brain and the cerebellum were perfectly healthy; the bowels were in many places irregularly distended with flatus."—*Abercrombie.*

By the term acute hydrocephalus, a disease is understood common in infancy, yet occurring occasionally later in life, the nature of which is inflammation of the brain and its membranes, with a tendency to terminate in serous effusion, and characterized by a combination of all or several of these symptoms,—pain in the head, sensibility to light, restlessness, starting from sleep and screaming, squinting, convulsions, dilatation of the pupils, coma.

Attacks corresponding to this description are frequently fatal without having gone beyond the inflammatory stage.

"A child, aged two and a half years, affected with hooping cough in a very mild form, was attacked, in the end of May 1822, with a convulsive twisting of the hands, to which she had been formerly liable at an early period of life; this excited no alarm till the 4th of June, when she was seized with general convulsion, accompanied with fever, headach, and an obstinate state of the bowels. All the usual remedies were employed with activity, but the convulsions continued to recur several times in the day, and she died on the 8th. The cough had gone on, but in a mild and favourable form.

"*Inspection.*—There was slight increase of vascularity of the pia mater, with numerous red points throughout the medullary substance of the brain. No other disease could be discovered on the most careful examination, and all the other organs were healthy."—*Abercrombie.*

"A child, aged five, affected with hooping cough, on 5th June 1822, was seized with headach and fever; had afterwards irregular motion of the eyes, with occasional squinting, then violent convulsions, which recurred frequently and alternated with coma; and he died in three days. After death, nothing could be discovered, on the

" *Inspection.*—The ventricles were distended with fluid, and there was extensive ramollissement of the septum and fornix, and of the cerebral matter immediately surrounding the ventricles."

——— aged nineteen. May 5th, having previously enjoyed good health, was seized suddenly with intense pain over the eyes, which continued very severe: the following morning sickness and vomiting supervened. He retained his intelligence till the 10th, after which he scarcely spoke till the 17th, when for a short time he appeared more sensible: he was delirious during the night: latterly evacuations passed unconsciously. On the 20th of May he was admitted into Guy's Hospital under Dr. Addison. At that time, face flushed, eyes suffused and fixed, yet seeming occasionally to follow objects; pupils rather dilated, and nearly insensible; breathing sonorous; deglutition imperfect; power of motion in the extremities perfect, but feeble; pulse 140: became convulsed towards the evening, and died.

Dura mater natural; arachnoïd dry; veins of pia mater turgid; convolutions of the brain flattened. Bloody points in the substance of the hemispheres. Corpus callosum arched by fluid beneath, of which there were three ounces in the ventricles: parietes of the ventricles soft: vessels of the chorioïd plexus turgid.—*Bright.*

Delirium tremens appears to be the supervention of inflammatory action in a brain already weakened by over-excitement, generally from drinking. It is attended by delirium of more or less violence, out of which the patient may be temporarily roused, by vascular action greater or less in degree which sometimes admits of reduction by purging and bleeding; by an enfeebled and tremulous character of the expression and gestures, continued from the previous state of health. In as far as the disease depends upon previous over-excitement, it is remarkably benefited by opium.

A. B., a butcher, aged forty-three, stout and broad built, addicted for twelve years to drinking: stomach disordered; had taken little solid food for three weeks. On the 17th, he found great difficulty in swallowing a cup of coffee, from the tremulous state of his hands and from sore throat: this was quickly followed by cerebral excitement, with delirium and violent muscular exertion. He died on the 19th.

The dura mater firmly adherent to the skull: several small cauliflower-shaped ossific patches on the dura mater, and especially on the falx, and a considerable quantity of serous effusion beneath the arachnoïd. The veins of the pia mater turgid. The cerebral matter generally pale, and the incised surface exhibited few bloody points. Part of the right lung was inflamed. — *Bright.*

A gentleman of intemperate habits had become suddenly delirious the day before. Leeches had been applied to his temples; and his delirium so far from being relieved seemed to be greatly aggravated, so that he passed the night in most violent agitation, requiring the strength of two or three persons to hold him. On his expressing a desire for a mutton chop and some porter, they were given him, and he was better for them. His mind became calm and collected: when Dr. Bright saw him shortly after, little but general nervous agitation and a hurried manner of speaking remained; and a few doses of opium with calomel were all that there was occasion to recommend. He afterwards said that the state of his mind during his delirium was such as to make him believe himself two persons; one of which, as in a dream, had committed murder, was tried and condemned; while the other was alive to real persons and things around him. — *Bright.*

§ VI. — *Concussion of the Brain.*

The direct effects of violent concussion of the brain are syncope, and something more. The syncope results from the physical influence which the brain exerts upon the heart, independently of the mind. The heart is struck with feebleness, the pulse is hardly to be felt, respiration scarcely takes place, the limbs are relaxed, the countenance and lips are pale and bloodless. As the heart rallies and its action returns, the effect of the concussion upon the condition of the mind becomes apparent. Its associations are unhinged and disjointed; one thought fails to suggest another; and the patient, although recovering, perpetually loses himself. A lady, who was thrown from her horse and stunned, yet recovered enough to be seated again upon her horse, and to ride home. She told me, that though able to keep her seat and to guide the horse, she was perpetually lost, and seemed every instant to be waking and collecting herself, and recollecting where she was.

It is sometimes many days before the brain rallies its powers. A boy was brought into the Middlesex Hospital labouring under concussion: for three weeks he continued in a state of remarkable insensibility, at times only, or when roused, screaming aloud: his pulse was extremely slow and languid all this time: he gradually recovered.

In other cases the mind recovers in a few hours, but not without falling into excitement, and trouble of thought, and slight delirium. In such a case, the patient requires the most careful watching and treatment, to ward off cerebral inflammation, which in any of its forms is liable to ensue.

It has been mentioned that simple concussion of the brain may bruise the cerebral substance; which if examined shortly after the injury, presents the common appearances of ecchymosis. There is no reason to doubt, that the brain may recover from this state; but if the bruising be considerable, it greatly increases the risk of subsequent inflammation.

Concussion of the brain is constantly attended with vomiting. The instance in medical pathology to which it is most parallel is the first stage of apoplexy from rupture of a vessel, which is characterized by paleness, feebleness of the pulse, and vomiting. In that case, in truth, the cause of the symptoms is equally mechanical — a blow from the gush of blood upon the brain.

§ VII. — *Compression of the Brain from external violence.*

The medical pathology of the brain throws the clearest light upon every part of its surgical pathology: the practical conclusions are the same for both; with this addition, that as the cause in the latter is external and mechanical, it is often possible to give mechanical relief: compression of the brain had begun to recover from this state of stupor, he was seized with violent convulsions, affecting not only the muscles of his limbs, but also those of his face. The first attack of convulsions continued about six minutes, but this was succeeded in the course of an hour and a quarter by four similar attacks, and in spite of a considerable quantity of blood being taken from the arm. At the end of this time Mr. Keate saw him, and made an incision through the scalp at that part which had received the violence of the injury. A fracture about an inch in length was discovered at the posterior part of the left parietal bone, extending into the lambdoidal suture with a slight depression. At this part Mr. Keate applied a saw, and removed the depressed portion of bone. A small coagulum of blood was found lying on the surface of the dura mater, and this having been exposed, there was no recurrence of the convulsions."

A patient under the care of Sir Benjamin Brodie, after a blow upon the head, experienced intense pain: he had no other symptom, except that the pupil of one eye was preternaturally dilated. There was a fracture, with depression of a very small portion of one parietal bone: immediately that it was elevated, the pain in the head was completely relieved.

Sophia Pennett, ætat. sixteen, was admitted into the Middlesex Hospital under the care of Mr. Joberns, on the 19th of October 1815. She had been knocked down in the street by a carriage, the wheel of which had grazed the left temple and denuded the parietal bone. She had lost a considerable quantity of blood from the temporal artery, was low and weak, and vomited. The part exposed did not recover: about a third of the surface of the parietal bone was necrosed. November 9th, having gone on favourably in the interval, but complaining occasionally of pain in the back of the head, she was taken with shivering, and sickness. Nov. 10, she could not articulate: pulse 90, and irregular; at times insensible. 12th, cannot put out her tongue: right side of the face and arm paralytic. Nov. 14, Mr. Joberns trephined the parietal bone, when about a teaspoonful of matter escaped, which had been confined between the bone diately sent for, found her lying as if in a fit of apoplexy. He ordered her head to be shaved, and, on examining it afterwards, discovered no wound of the scalp, but observed that she flinched very much when pressure was made on one spot near the anterior and superior angle of one of the parietal bones. Having made an incision of the scalp at this part, he could perceive no appearance of fracture. Nevertheless as the woman was manifestly in imminent danger, he thought it expedient to remove a portion of the bone with the trephine. Immediately on the bone being removed, the dura mater of a dark colour rose into the opening nearly as high as the external surface of the cranium. Convinced from its appearance, and from the feeling of tension communicated to the fingers, that a fluid was interposed between it and the brain, and that that fluid was blood, Mr. Ogle ventured to puncture the dura mater with the point of a lancet. The puncture was instantly followed by a stream or jet of blood, which spirted out to the height of some feet. Immediately on the blood being discharged, the woman, who till that moment had continued totally insensible, opened her eyes. After looking about her, apparently amazed, she exclaimed, 'What is the matter? what are you doing with me?' and was able to give a clear account of the manner in which the accident had occurred. From this time she recovered without any untoward symptoms. It was impossible to ascertain the precise quantity of blood which escaped through the opening of the dura mater, but Mr. Ogle supposes it to have been about three quarters of an ounce."—*Brodie.*

When after the removal of a portion of bone the dura mater sloughs, a new feature presents itself. The brain is assailed from within by an increased force of the circulation, at a time when its usual external support is wanting. Under these circumstances there gradually protrudes from the cranial cavity a rounded mass, partly consisting of the proper cerebral substance, partly of effused lymph and clotted blood. This protruded substance cannot be returned; nor even can its increase be strongly repressed, lest symptoms of compression should supervene. On the other hand, the tu-

e sup
ctive escape
on is here directed t
and making afterwards jus
e maintained without injury, to p
expression of brain.

The ideas generally entertained respecting the symptoms of concussion and compression of the brain are, that the former are no more than syncope; and that the latter consist of stupor, with one or both pupils fixed, stertor, laboured pulse and breathing, and commonly partial hemiplegia.

The remarks and instances above given tend however to show, that in concussion an effect of greater or less duration is producible on the mind after the syncope has passed away; and that by compression, not only the commoner symptoms adverted to may be produced, but all the others which medical pathology makes out to flow from the apoplectic states of the brain.

The different effects of compression are,—

1. Coma without stertor: commonly resulting from extensive cerebral laceration and hemorrhage; but sometimes from remediable extravasation. (p. 227.)

2. Coma with stertor, and partial hemiplegia; often resulting from depressed bone, or circumscribed extravasation or suppuration, upon the dura mater. (p. 225.)

3. Coma with violent convulsions; resulting from ext
on the surface of the brain, sometimes situ
the dura mater. (p. 224-5.)

4. Epileptic seizures: from small circumscribed e
of bone ?] upon the dura mater. (p. 2

5. Acute pain in the head, from depression of bone

6. and great decline of frequency in
in a child, supervening several
skull. The symptom was follow
hemiplegia: there was ext
and dura mater.

CHAPTER VIII.

THE SKIN.

The pathology of the skin, from its numerous divisions, from the minute and trivial character which attaches to many of them, and the vast importance and extent of investigation which others claim for themselves, is hardly a fit subject to be included in the present treatise. I have, however, ventured to compress within a few pages a sketch of the affections of the skin, in the belief that, imperfect as the following outline is, it may not be unacceptable or useless to the reader.

I have divided the subject into three sections. In the first, I have included affections of the skin, which have points in common with the pathology of other organs: in the second, I have given the peculiar diseases, principally of an inflammatory nature, and constituting eruptions, which so singularly characterize this organ: in the third, I have enumerated the principal forms of ulcers in which the skin is involved.

In the second section, I have closely followed and adopted the descriptions of Rayer, from Dr. Willis's excellent translation, replacing only, which I think he has unwisely separated, the notice of the syphilitic eruptions among the others. In the first, I have borrowed many parts from Rayer. In the third, what I have stated is the result of my own observation, concurring, I suppose, with that of other surgeons.

SECTION I.

s and *Reparation of the Skin.*—No texture in the
es by adhesion with such promptness as the skin.
n of union is a thin layer of lymph, which in co-
gines together the opposed surfaces, and afterwards
penetrated by the blood-vessels, is finally absorbed.
a section of the skin of small extent is established
an twenty-four hours. The reparation, however,
at time little mechanical strength, and the divided
asily forced open. In incisions of any extent, union
ained by the fourth day. About the third or fourth
ceeding a wound, unless adhesion has taken place,
mation supervenes; upon which serum is poured out
the swollen edges, and the intervening layer of lymph
her detached or absorbed.

[illegible] the injury of the skin is superficial only, and pa-
[illegible] the surface. the cuticle is liable to be razed and
[illegible] serum being poured out below it, it may be
[illegible] form a blister. In either case the cuticle
[illegible]

[illegible] of the cutis may perish, through
[illegible] or a severe burn. In this case the
[illegible] detached by the process of ulcera-
[illegible] cellular tissue pours out lymph, which
[illegible] organized forms granulations.
[illegible] a certain height and firmness,
[illegible] the edges of the healing sore, or at its
[illegible] becomes opaque, smooth, and white:
[illegible] produced gradually spreads over th
[illegible] the cicatrix. In time a cicat
[illegible] than the adjacent skin: at t
[illegible] together from the circumference, stret
[illegible] sound integument. A cicatrix is
[illegible] surface. which however canno
[illegible]

detached from it. In the coloured races of mankind, a cicatrix is at first white; but it gradually becomes darker than the adjoining skin.

When the cuticle has been raised by blistering, the application of irritants to the skin causes the exposed surface of the chorion to granulate and suppurate. The irritant being removed, the inflammation subsides, and cuticle is again formed.

Continued exposure of the feet and hands to cold causes the integument to inflame, producing chilblain. In this affection the skin is at first white, then becomes red and swollen, tingling and itching when warmed. The red colour afterwards changes to a leaden hue. In a severer form, the cuticle is raised in blisters, leaving indolent excoriations; or gangrene may take place.

White gangrene is an affection of the skin, in which, without any assignable cause or preliminary symptom, patches of skin, of the area of one, two, or three square inches, suddenly die. White gangrene occurs sometimes on the breast. In the museum of King's College there is a model of white gangrene, in which the disease attacked the arm, several patches of cutaneous gangrene successively forming: the sphacelated parts were white from the commencement of the process to their separation, when healing and healthily granulating sores were left. [A. 1.]

2. *Hypertrophy of the Skin* presents several forms.

Hypertrophy of the Chorion.—The skin over subcutaneous tumours grows with their growth: hence in their extirpation it is generally necessary to remove part of the integument covering them.

The skin, in a person whose arm is modelled in the King's College museum, is thickened upon the back part of the limb, of a brown colour, and hangs in a thick pendulous flap several inches in length. The hypertrophy was congenital.

The integuments of the nose are particularly liable to enlarge and thicken. After the removal of a part of the hypertrophied mass, the wound cicatrizes wholesomely.

The extension or thickening of the integuments is a prominent feature in the elephantiasis Arabica and Barbadoes [illegible] skin and epidermis in these instances partake [illegible] enlargement, the result as it seems of [illegible].

[illegible] *P*[illegible]. — Ulcers of the legs, chronic [illegible] and blisters, are occasionally [illegible] by an unusual development of the [illegible] become particularly apparent when the part [illegible] in water, and look mammillated and [illegible] like the pile of coarse plush or velvet. The skin in [illegible] covered with scales of epidermis, [illegible] generally brown, and [illegible].

[illegible] *Epidermis*. — Ichthyosis is the name [illegible] this affection, which is generally congenital, some-[illegible], and is met with in various degrees of in-[illegible].

The [illegible] in some instances looks only dry, rough, and [illegible] greatest thickness of cuticle being [illegible] naturally disposed to [illegible] as at the knee, the elbow, the fore and outer part [illegible].

[illegible] thickened epidermis has an appearance [illegible] the legs of fowls.

[illegible] family of Lambert, the porcupine [illegible] with the exception of the face, the [illegible] soles of the feet, is covered with [illegible] in the shape of pimples, so hard [illegible] make a noise when the hand is [illegible] them.

[illegible] of the scales, is not u [illegible] The scales are often shed at regular p [illegible] applied to the skin, or [illegible] will detach them:

[illegible] *Epidermis*.—Warts or [illegible] vascular papillæ en [illegible]

— [illegible] or alterati [illegible] various ca *a. Pigmentary nævi* are congenital stains of different colours.

b. Ephelis. The browning produced by the sun.

c. Lentigo, freckles: small yellow spots, appearing from the period of infancy in persons with light or red hair and light blue eyes.

d. Chloasma [*pytyriasis versicolor*], characterized by one or more accidental spots or patches, from the size of a millet seed to that of the palm of the hand: they are dry, generally without pruritus, and of a pale or brownish yellow colour, which are seldom developed but in the trunk. Spots of chloasma are more particularly observed among persons whose skins are fine and delicate, and among pregnant women. Their duration is very variable.

e. Melasma [*pytyriasis nigra*], temporary blackness, with roughness of the skin, and furfuraceous desquamation.

f. Nigrities, change of colour to blackness.

A lady, says Lecat, about thirty years of age, became pregnant. About the seventh month the forehead assumed a dusky hue, of the colour of iron rust: by degrees the whole face became entirely black, except the eyes and the edges of the lips, which retained their natural colour. The hue was deeper on some days than others. This lady being naturally of a very fair complexion had the appearance of an alabaster figure with a black marble head. Her hair was naturally exceedingly dark; but the part of it which grew from the dark-coloured skin appeared coarser, and filled with a blacker sap than the rest, to the height of about a line or two above its roots. She did not suffer from headach; the appetite was good; the face after becoming black was very tender to the touch: the black colour disappeared two days after her accouchement, with a profuse perspiration, by which the sheets were stained black. The child was of a natural colour. In the following pregnancy, and even in a third, the same phenomenon reappeared in the course of the seventh month: in the eighth month it disappeared; but during this month the lady became subject to convulsions, of which she had an attack each day.

g. Leucopathia. The conversion of the skin to a colour three days of fever: ordinary duration from two to three weeks. There is likewise a purpura urticans febrilis. When purpura exists, trifling pressure upon the skin produces ecchymosis.

Purpura Senilis.—Spots the colour of wine lees, lasting a month or more, on the hands and arms of elderly people, without attendant symptoms.

Petechial spots occur incidentally in typhoïd forms of the gravest class.

5. *Alterations in the condition of the Blood Vessels.*—Of these there are two principal.

a. A varicose state of the minute Veins.—This is often seen in the skin of the thighs, legs, and insteps of persons in whom the venous trunks are varicose. One of these minute veins will sometimes give way, and bleed with surprising violence. The remedy is to destroy the vessel with caustic potass.

b. Vascular Nævus.—This affection is congenital. At birth it looks like a fleabite, but growing rapidly, it becomes a raised and highly vascular tumour of the skin; generally circular, but often of an irregular figure, from the junction of two or three adjacent nævi. Left to itself, a vascular nævus enlarges and ulcerates, and bleeds, and the infant sinks. These tumours, when very minute, may be cured by vaccinating upon them; if larger they require to be removed by the knife, the ligature, or the caustic. [*m.* 6.]

The texture of which they are composed does not appear to me to deserve the name of erectile tissue. The vascularity I believe to be arterial, not venous. When divided in an operation, these tumours pour out arterial blood profusely. When removed and examined, they are found to be lobulated, of a firm texture, and of a pink colour from the blood they have contained. The edge of the morbid structure is clearly defined.

This structure is not confined to the skin; I have seen it in the parotid gland, in the lymphatic glands, in the gland of the breast in an infant, in the subcutaneous cellular membrane in different parts. Large subcutaneous nævi are often combined with small nævi of the integuments.

hardened glands, as big as an orange, in the left groin, which had given so little uneasiness, that before the operation, she said there was no swelling there. They show no present disposition to enlarge. The tumour removed was of a white, dense, crisp texture, with membranous bands intersecting it.

Melanosis.—Melanosis may be deposited in grains within the substance of the skin, or may form true tumours in its substance, or upon its surface. Deposits of the same description almost always take place at the same time in one or more of the internal organs.

The skin is sometimes black with numerous melanotic tumours, like black currants or juniper berries. They are black throughout, and when cut through, present a great resemblance to the parenchyma of a truffle. In other cases, a single large cutaneous melanic tumour presents itself.

Melanic tumours rarely inflame. Messrs. Breschet and Fernes have, however, met with ulcerated melanosis several inches in extent; and situated in the right groin, in an old woman, at the Salpetrière. This sore discharged a kind of blackish fluid, which stained paper and linen in the same manner as nitrate of silver.

Medullary Sarcoma.—In the neighbourhood of medullary sarcoma of the breast, fungoïd tubercles continually form in the skin.

7. *Disordered Transpiration.*—The perspiration varies in quantity, in quality, in place, in odour, in different complaints; and it is capable, probably, were its differences well ascertained, of throwing light upon the nature and progress of various diseases.

Blue Sweats.—Victorine Rufland, aged sixteen (in a case described by M. Ballard), stout in person, pulse regular, catamenia natural, strength and appetite good, but with a loaded tongue and dry cough; presented on the neck, face, and upper part of the chest a beautiful blue tint of the skin, principally spread over the forehead, alæ nasi, and round the mouth. When these parts were wiped with a white towel, the blue colouring matter was detached from the integument, and stained the towel, leaving the skin white. She had been engaged as a laundress for the last two years;

b. Follicular Elevations and Tumours.—When the orifice of a sebaceous duct becomes obstructed, the secretion is liable to accumulate in a small round sac, of the size of a pin's head. Or it may acquire considerable magnitude, the size for instance of a chesnut, and the secretion retains its peculiar odour and character; and when punctured or squeezed, shows no disposition to reaccumulate in undue quantity.

It has been supposed that the encysted tumours of the scalp, face, and neck, have no other origin than obstructed sebaceous follicles. Sir Astley Cooper showed, that the horns which grow upon the head and eyelids and forehead, are growths from the lining follicular membrane.

Calcareous Matter is liable to form in the sebaceous follicles. I removed from one of the meibomean ducts a small calculus which projected from it, and by scratching the surface of the cornea, had for several days kept up inflammation of the conjunctiva

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SECTION II.

§ I. EXANTHEMATA.

Inflammatory affections of parts or the whole surface of the skin, in which the highest point of development is the local accumulation of blood.

1. *Erythema.*—An uninfectious exanthema, occurring without fever, characterized by one or more red blotches, varying from a few lines to many inches in diameter; confined to one, or scattered over several regions of the body, the duration of which in the acute state varies from one to two weeks.

a. Erythema *intertrigo.* Redness of the skin, arising where two surfaces in contact are chafed, liable to be attended with slight thickening and itching, and serous or purulent discharge. The skin afterwards rough and chapped.

b. Erythema *pepulatum.* Small red spots not exceeding the size of a split-pea, irregularly rounded; occurring on the and the fluid they contain dries and forms thin, hard, yellowish crusts, which afterwards blacken. When the inflammation is less severe, the skin on recovering desquamates.

b. Phlegmonous erysipelas, is the complication of cutaneous erysipelas with spreading inflammation and infiltration of the cellular membrane. This complication is rarely met with in erysipelas of the head and face, except about the eyelids, where suppuration and sloughing occasionally take place. It is common in the extremities after slight injuries of the skin. It is attended with great swelling; and unless incisions are made to let out the acrid humour with which the cellular membrane is loaded, it suppurates, and, the skin being isolated, sloughs in large patches.

c. Erratic erysipelas. Erysipelas that has been excited by any local cause will often, when the skin first attacked is recovering, spread over the adjacent surface of the body, one edge being yellow and desquamating; while the opposite and spreading side, having an irregular but definite margin, is of a bright red. This affection often continues with very little constitutional disturbance.

3. *Rubeola*, or *Measles*, an exanthematous and contagious inflammation, preceded by chills and shivering; accompanied by watering of the eyes, sneezing, and hard dry cough; and characterized externally by an eruption of small red spots of the size of fleabites, prominent at the points, where the cutaneous follicles surpass the general level, separated by irregular narrow interstices, in which the skin seems healthy; forming afterwards by their conjunction small crescent-shaped patches, which decline towards the seventh or eighth day of the attack, and are commonly followed by bran-like desquamation.

Rubeola *vulgaris*. A week to a fortnight after exposure to infection fever supervenes, with nausea; tongue white, tip and edges scarlet. Second day: fever aggravated, sneezing, eyes suffused and watering, cough. Third: fever aggravated, eyes swollen, voice hoarse, cough, constriction of the chest. Fourth: after vomiting, diarrhœa, or sweating, an eruption of small red spots on the forehead, chin, nose,

mouth, gradually by the next day exten
k, breast, and limbs; itching and heat of skin: other
ppearing, form by their conjunction small crescent-
d patches: spots on the soft palate. Fifth: the red
r of the patches at its height upon the face. Sixth:
eruption begins to decline there; on other parts of the
y becomes more abundant. Seventh and eighth: the
ches begin to die off in the order of their appearance,
d then assume a pale-yellowish colour.

With the completion of the eruption, the general symp-
oms decline in intensity. The sense of pectoral oppression
and cough alone continue in some individuals: the nausea
and vomiting have ceased from the fourth day; and the
sense of heat, oppression, and restlessness, generally vanish
about the sixth.

The patches of measles convey an impression of a rough, uneven, or prominent surface. They disappear on stretching the skin: the yellow spots into which they degenerate do not. On their decline, the epidermis roughens, separating in a minute bran-like scurf, attended with itching, that lasts till the tenth or twelfth day.

Rubeola *sine catarrho.*—*Vide* Roseola.

Rubeola *nigra.* In persons of a weakly constitution, the eruption towards the seventh or eighth day become black.

Rubeolæ *anomalæ.* The eruption appearing on the thi
or delayed to the sixth day; or sudden secession; or
pearing on the arms before the face.

Scarlatina.—A contagious exanthematous disease, w
after one or two days' continuance of fever, is announc
an eruption of small red points, which are soon repla
large irregular patches of a scarlet or strawberry-red
extending to almost the whole surface of the body
panied by sore throat, and ending in desquamati
end of the first week.

Scarlatina *simplex.* Four days after infecti
nausea, drowsiness. Second day: face swelled,
not prominent nor bright at first, but subsequ
vivid hue, separated by intervals of na

appear in great numbers on the face, neck, and breast; and within twenty-four hours over the whole body, the lips also, the tongue, the palati, and pharynx. Third: the eruption becomes continuous on the cheeks and limbs, and becomes scarlet. A few papular elevations on the hands, the chest, and extremities. The skin burning, itching, parched, tender; its surface in some places rough: hands and feet swelled and painful. The eruption deepest towards evening; in the morning less vivid. The efflorescence rarely general: on the trunk in large patches, dotted as it were around their margins, and very various in their outlines. Fifth or sixth day: the eruption begins to grow pale. Seventh: its character indistinct. Eighth to ninth: desquamation. On the second or third day of the eruption, remission of general symptoms, when a second crop of efflorescence sometimes appears.

Scarlatina *anginosa*. Preliminary symptoms more severe. Stiffness of the muscles of the throat. Second day: inflammation of the fauces, with thick viscid secretion. Eruption often a day later; not so general; vanishes sometimes and reappears, and is of longer duration. Tumefaction of the subcutaneous cellular membrane in the face and fingers.

Scarlatina *maligna*. The attack as in the preceding, leading to cerebral and typhoïd symptoms. The efflorescence tardy, colour pale and livid, sometimes mixed with petechiæ; may appear and disappear once and again.

Scarlatina *sine Exanthemata*.

4. *Roseola*. — This class comprehends several eruptions acute in their nature, not contagious, transitory, characterized by red spots variously figured, slightly or not at all prominent, and usually preceded and accompanied by febrile symptoms.

a. Roseola *æstiva*. Small distinct patches, separated by numerous intervals, larger, paler, and more irregular than those of measles, sometimes preceded by slight fever. First and second days' eruptions a lively red. Third: declension, the colour a dull red. Fifth: disappearance, and return to health. The pharynx has the same light redness as the skin, and is dry. At times the eruption limited to slightly raised and itching patches on the face, neck, breast, and shoulders, something between urticaria and erythema.

b. Roseola *autumnalis.* A variety of erythema, attacking children in distinct circular or oval spots, of a dusky red, which gradually increase to the size of a shilling: principally situated on the arms.

c. Roseola *annulata.* Rosy rings enclosing areæ of the natural colour, spreading from a line to an inch and half in diameter: duration indefinite without fever, brief with fever.

d. Roseola *infantilis.* The spots have smaller intervals than roseola æstiva. It sometimes exists for a single night, or comes and goes during several days: liable to be confounded with measles.

e. Roseola *variolosa.* An almost generally diffused efflorescence, slightly prominent in some points, occurring once in fifteen cases on the second day of the eruptive fever of small pox, commencing on the arms, breast, and face: it lasts about three days.

f. Roseola *vaccina.* Either small confluent patches, or generally diffused, coming on from the ninth to the tenth day after vaccination, spreading from around the vesicle over the entire surface of the body: commonly accompanied with acceleration of the pulse, and slight anxiety.

g. Roseola *febrilis.* Occurring in continued or typhoïd fever.

h. Roseola *rheumatica.* Small, round, isolated spots, of the size of a millet seed, rarely prominent, of a violet or blackish red: breaking out in the legs, and attended with gastric disturbance or considerable fever; connected with rheumatism and gout.

i. Roseola *colerica.* Bright red patches, of an irregularly circular shape, appearing on the body, chest, hands, and arms, in the stage of reaction of cholera.

5. *Urticaria.*—An exanthematous non-contagious inflammation, characterized by an eruption of prominent spots or wheals paler or redder than the surrounding skin, rarely of long continuance, appearing after febrile symptoms, often

recurring at intervals, or becoming aggravated by fits, and always attended by the burning and itching sensation that follows the sting of a nettle.

Urticaria *Acuta.*

U. A. *ab ingestis.* In an hour or two after the food that disagrees (especially shell fish), nausea, sinking, giddiness; then hot skin; and the eruption on the shoulders, loins, fore-arms, thighs, of irregularly-shaped wheals. When they are numerous, the skin has generally a red tint, and the limbs are swollen and stiff. If no severe gastric symptoms supervene, at the end of twenty-four to thirty-six hours, the eruption declines.

U. A. *febrilis.* Slight febrile attack of at least a week's duration, with urticaria during the greater part of it.

Urticaria *Chronica.*

U. C. *evanida.* Wheals like those produced by flagellations, that come and go, and are generally dependent on disturbed digestion.

U. C. *tuberosa.* Wheals of various magnitudes, hard, deep-seated, extending to the subcutaneous cellular texture, with a tense and sore state of the skin; attended with great itching, coming on at night, and disappearing before morning, leaving the patient weakened, restless, depressed, languid. The attack is commonly developed in a febrile paroxysm. The disorder is irregular in its progress, leaving and returning, and lasting often with intermissions for many months.

§ II. — Bullæ,

Are inflammations of the skin, characterized when at their height by small bladders, varying in size from that of a pea to that of a goose's egg, generally transparent, and formed by the effusion of a serous or sero-purulent fluid between the chorion and cuticle.

1. *Pemphigus,* an eruption on several regions of the body, of one or more large yellowish and transparent bullæ, which break, and are followed by a scab or superficial excoriation.

a. Acute pemphigus. After one, two, or three days of fever, one or more circular or oval red spots appear on the trunk, limbs, and face, most commonly on the lower extremities. These spots are slightly prominent, and vary from a few lines to several inches in diameter. They are at first of a bright red, but soon turn to a more dusky hue. They are then transformed, and often very rapidly, into bullæ. The number is variable, from a single one to many: the greater number contain a transparent yellowish-green serum. Coagulated lymph is sometimes deposited in the chorion. They reach their acme in three days, after which they become flaccid, wrinkled, and half full; and, breaking, lamellar incrustations form on the inflamed skin, which, being detached, leave spots of a dusky red hue. The duration of each extends to about seven days: that of acute pemphigus varies from one to two weeks when the eruption is *simultaneous*, and from three to four weeks when it is *consecutive*.

b. Chronic pemphigus: *pompholix diutinus*. Bullæ succeeding each other at various intervals, during from ten weeks to seven or eight months, and occasionally during several years. The new bullæ arise in the neighbourhood of the old ones, and are sometimes preceded by a febrile paroxysm and lancinating pain. [A. 3.]

2. *Rupia*. Small, isolated, flattened bullæ, filled with a serous fluid, which soon becomes opaque, puriform, or sanguinolent; and to which succeed black, thick, and prominent scabs, whose bases conceal ulcers of variable depths.

a. Rupia *simplex* is more common on the lower part of the body and limbs than on the upper. The circumference of each flattened bulla is from a sixpence to a shilling. The fluid becomes purulent, and then crusts; the crust thickening, and being highest in the centre. On detaching the crust, the cutis is found red and thickened, ulcerated, and honeycombed. The crust forms again as long as the disposition to the disease lasts. [A. 4.]

b. Rupia *prominens*. The ulcer larger, the crust thicker, forming a cone. In each form of rupia, the ulcer and crust enlarge after their first bullous formation.

c. Rupia *escharotica* begins by one or two red and livid spots, over which the cuticle is soon raised by the effusion under it of a serous or sero-sanguinolent fluid. The bullæ go on increasing in an irregular manner: the serum they contain becomes turbid, and acquires a blackish colour. By and by they give way, and the skin exposed appears ulcerated, softened, or gangrenous, in different parts; a bloody and offensive sanies bathes the surface of the sore, the edges of which are livid, and not very painful.

I have seen each of these forms of rupia occur in succession, in a patient who had taken mercury for syphilitic sore throat at the appearance of the first: they continued to develop themselves at intervals. She died, having never thrown off the disposition to rupia, in about eight months, of phthisis.

§ III.—VESICULÆ.

This group is characterized by vesicles, or small serous and transparent elevations, differing from bullæ in nothing but their smaller size, and formed by a globule of serum with or without coagulable lymph effused beneath the cuticle. These minute drops of serum may either be reabsorbed, or the vesicles burst; desquamation, superficial excoriation, or small thin crusts, following.

1. *Herpes.*—Clusters of distinct vesicles inflamed at their bases, not contagious.

a. Herpes *zoster.* With or without previous fever; but after smarting and local pain, irregular blotches of a rather vivid red appear, upon which are formed several oval groups of silvery-grey vesicles, mixed with irregular bullæ, surrounded by a red crust. The vesicles are of the form and size of seed pearls: in three or four days they acquire the volume of a large pea. The patches upon which they are clustered then become more florid. At the end of five or six days the fluid contained in the vesicles becomes opalescent, then sero-purulent; and when the inflammation runs high, true pus. The greater number of the vesicles dry and crust; some, from which the cuticle is detached, suppurate. The greater number of the vesicular groups appear in succession: while those first observed are drying off, new clusters [illegible] between them. After the lapse of [illegible] dating from the period of the [illegible] incrustations are detached. [A. 10.] [illegible] do not terminate so speedily when the [illegible]. A similar [illegible] attacks that part of [illegible]

[illegible] characterized by clusters of glo- [illegible] as large as small seeds or [illegible] in variable numbers upon [illegible] and disseminated [illegible]

[illegible] ring of vesicles, forming [illegible] tingling and tension, and [illegible]. When occurring [illegible] injury.

[illegible] rings of vesicles, on a [illegible] and dry in a few days.

Herpes [illegible]; of each a like history.

Herpes iris. [illegible] in conjunction with other varieties of herpes, or alone. This variety is distinguished by four concentric erythematous rings of different shades of colour.

Eczema. — A non-contagious inflammation of the skin, characterized at its commencement by an eruption of very small and non-prominent vesicles, commonly crowded together, which terminate either in the absorption of the fluid, or in superficial excoriations, to which succeeds furfuraceous desquamation.

Eczema *simplex.* The skin of a natural colour, without heat or tumefaction, becomes covered with minute vesicles, [illegible] the apertures for the [illegible] is often succeeded by another.

Eczema *rubrum.* The skin hot, red, and shining, be- [illegible] eruption.

[illegible]. In its acute form, the tension, [illegible] intolerable; and not tingling and itching [illegible] violent smarting pain. The vesicles pass readily into the purulent state: the cuticle raised in large flaps, is impregnated with the fluid effused, and acquires the appearance of greenish-coloured laminated scabs, which being before long detached, a surface is exposed of as bright a red as carmine. When the eruption is considerable, there is profuse secretion of fluid.

These forms of eczema, especially the two last, are liable to persist in a chronic character, the irritation, however, rather increasing when the vesicles have burst and the skin is partly dry and chapped; and fresh eruption ensues.

d. Eczema *of the scalp.* Heat, swelling, redness, vesicles, with a sort of cheesy or sebaceous exudation, attended with violent itching.

e. Eczema *of the face.* Liable to crust in thin greenish yellow scabs, between which fresh vesicles appear.

f. Eczema *aurium, mammillarum, umbilicalis,* &c.

3. *Hydrargyria* (*eczema mercuriale*).—A cutaneous inflammation, excited by the internal or external use of mercury, characterized by an evolution of vesicles with or without fever, upon red and inflamed patches of various sizes.

a. Hydrargyria *mitis.* A slight rosy efflorescence, which upon looking narrowly is seen to be covered with exceedingly minute vesicles, generally appearing about the upper and inner part of the thighs, the scrotum, and lower parts of the abdomen, and attended by violent heat and smarting.

b. Hydrargyria *febrilis.* After fever, an eruption like that of measles; but at the end of the second day the patches unite into larger patches than the morbillary, and are not arranged in arcs of circles. On the third and fourth days the greater part of the surface of the body is covered. The vesicles are larger and more distinct than in hydrargyria mitis; they become as big as pins' heads, and purulent.

c. Hydrargyria *maligna.* Great heat of skin; the throat and tonsils painful; the eruption of a deep or purple red colour; the face and eyelids swollen; the vesicles larger and crowded together; the discharge offensive.

The epidermis is thrown off at a much later period in this than in the two former varieties; and it scarcely happens before the fortieth day from the date of the eruption. The cuticle occasionally falls entire from the hand like a glove. Thick yellow scabs follow the detachment of the epidermis, which peel off in layers; a fresh incrustation succeeds a fresh flow of serum, and each new desquamation discovers a surface less and less red.

4. *Scabies.* — An inflammatory affection of the skin, unaccompanied with fever, contagious, and characterized by an eruption of pointed vesicles, transparent on their summits, filled with a viscid and serous fluid, and constantly attended with pruritus. The eruption usually takes place in children four or five days after exposure to contagion; in adults from the eighth to the fifteenth day; in the aged occasionally a month: the disease left to itself never gets well. The *character* of the disease is moditied by the effects of scratching the vesicles, among which *accidental* pustules and lichen make their appearance.

5. *Miliaris sudatoria.* — An eruptive and contagious febrile disorder, which almost always appears as an epidemic, and is characterized on the exterior by a copious and continued sweat, and generally by the eruption of small rounded vesicles, the size of millet seeds. It assumes two principal forms, the benign and the malignant.

6. *Sudamina.* — Minute permanent vesicles, round, transparent, of the size of millet seeds, without accompanying redness of the skin; a symptom occasionally attendant on the progress of severe febrile disease.

§ IV. — PUSTULÆ.

Pustules consist of small collections of matter enclosed between the cuticle and a circumscribed spot of inflamed and thickened skin.

Seven forms of pustular inflammation of the skin are reckoned; variolæ and its modifications (varicellæ); vaccinia and its modifications (vaccinellæ); acne; rosacea; mentagra or sycosis; impetigo; favus; ecthyma. Of these I necessarily in the present work pass over the two first.

3. *Acne.* — Chronic inflammation of the sebaceous follicles,

common in youth and manhood, characterized by isolated acuminated pustules, most usually developed on the shoulders, sternal, and scapular regions, the skin of which looks dense and unctuous, and more rarely on the face. These pustules are succeeded by livid or violet-coloured spots, by tuberculated indurations of the same or of a milky white hue, almost always intermingled with the accumulations of sebaceous matter with black points, vulgarly called *worms*, and with follicular enlargements.

4. *Rosacea.* — A chronic non-contagious inflammation, affecting the follicles of the skin of the face, characterized by the successive eruption of small isolated and acuminated pustules, the bases of which, indurated in different degrees, are surrounded by an inflamed areola. These pustules appear dispersed especially over the cheeks, nose, and forehead, and occasionally extend to the ears and upper parts of the neck. To these pustules succeed a dilated and arborescent state of the superficial blood-vessels in their vicinity, or small hard, red, circumscribed, and excessively indolent tubercular indurations, the resolution of which is always brought about with extreme difficulty, if ever it can be accomplished entirely.

5. *Sycosis* is characterized by the successive evolution of a number of small pointed pustules, similar to those of rosacea, and scattered singly or clustered together over the chin, upper lip, submaxillary region, and lateral parts of the face.

6. *Impetigo* is a cutaneous affection, unaccompanied by fever, characterized by the eruption of one or more crops of pustules, disseminated or collected in clusters, the contents of which dry up before long, and assume the form of yellowish, rough, and permanent incrustations. It may invade every part of the body. It appears under two principal forms. The small pustules that characterize it being in the one disposed in circular or oval groups (impetigo *figurata*), in the other disseminated over a surface of variable extent (impetigo *sparsa*). [A. 20.]

Each of these forms of the disease is acute or chronic, [illegible] successive [illegible]

[illegible] —A chronic [illegible] grows in [illegible] appearance [illegible] very dry, [illegible] and [illegible] masses with [illegible] presents [illegible] occurs [illegible]

[illegible] begins under the [illegible] above the [illegible] small yellow [illegible] the [illegible] distinct and con-[illegible]

[illegible] arranged in [illegible] regular [illegible]

[illegible] dry, and falls [illegible] been [illegible] contain [illegible] of the [illegible] two [illegible]

[illegible] elevations [illegible] and a large [illegible] as their [illegible] pustules bear a [illegible] the pustules of [illegible] few days. The development of acute ecthyma is characterized by lancinating pain in the part.

b. Chronic ecthyma, differs from the preceding in the continued succession of pustules.

c. Syphilitic ecthyma, is generally distinguished by less inflammation, and a more coppery hue at the base of the pustule.

§ V. — FURUNCULAR INFLAMMATIONS,

Have their seat in the chorion, and subcutaneous tissue.

a. Furunculus, or *boil.* A hard conical tumour, of a livid or violet-red colour, at first of minute size, enlarging afterwards to a considerable size. From the fourth to the eighth day, it rises to a point; the apex becomes white, softens, and finally gives way, when a small quantity of sanguinolent pus escapes, and the top of a sloughy substance is exposed, which is a small piece of cellular membrane infiltrated with pus: this is thrown out between the tenth and the twelfth day.

b. Anthrax, a large hard painful boil, of a deeper red, with a larger slough, commonly situated upon the nape of the neck, the back and shoulders.

c. Anthracion. A large vesication or bleb, full of a sero-sanguinolent fluid: under this a small lenticular inflammation is formed, which is itself speedily surrounded by a phlegmono-erysipelatous areolar swelling, a larger or smaller portion of which is before long stricken with gangrene.

§ VI. — PAPULÆ.

Papulæ or pimples are hard and solid elevations, attended with pruritus, terminating by resolution and furfuraceous desquamation.

1. *Lichen.* — A simultaneous or successive eruption of itching papulæ, reddish in their colour, or of the natural hue of the skin, most commonly clustered together, but occasionally scattered, and occupying a particular region, or

disseminated over the whole surface of the body. I believe that the first three forms occur as syphilitic eruptions.

a. Lichen *simplex.* Often ushered in by febrile symptoms, confined to one part, or spreading from thence over the whole body: small solid elevations, red, not transparent, frequently acuminated, containing neither pus nor serum, and seldom exceeding a millet seed in size. [A. 30.]

b. Lichen *pilaris.* Differing from the preceding only in the place of the papulæ being at the points of escape of the hair.

c. Lichen *circumscriptus.* One or several clusters of papulæ, pretty regularly circular in their shapes, and bounded by a well-defined edge.

d. Lichen *agrius.* The papulæ prominent, acuminated, of a vivid red colour, running one into another, over an erythematous surface, attended with a febrile state, and intolerable burning and itching. Duration, with remissions, for months.

e. Lichen *urticatus.*

f. Lichen *luridus.*

g. Lichen *tropicus.* Sensations of pricking, itching, tingling, suddenly brought out in tropical climates, by exercise, or any source of stimulation, and often attended with vivid red pimples, not larger than a pin's head. It subsides with quiet and coolness.

2. *Strophulus* is the lichen of infants: the varieties re strophulus intestinatus, s. albidus, s. confertus, s. volaticus.

3. *Prurigo.* An eruption of papulæ, nearly of the colour of the skin, attended with intense pruritus. The papillæ larger than those of lichen, after having been torn by the nails, are replaced by small black and circular scabs.

a. Prurigo *mitis.* Papulæ softer and broader than those of lichen.

b. Prurigo *formicans.* Papulæ larger than in prurigo mitis, intense tingling and burning itching.

c. Prurigo *senilis.*

§ VII. — SQUAMÆ.

Red elevations, spots, or blotches, from which laminæ of cuticle, altered in different degrees, are formed, thrown off, and incessantly renewed.

1. *Lepra.* Scaly patches of different dimensions, of a round or orbicular shape, slightly depressed in the centre, surrounded by a red and prominent circle, disjoined, or united with other patches.

a. Lepra *vulgaris.* Small solid elevations first appear, round which, numbers of other reddish-coloured prominent spots, about a line in diameter, of a circular form and firm consistence, are observed. The summit of these elevations, smooth in the earlier stages, become some few days after covered with a small epidermic scale, white, transparent, smooth, and polished. This minute spangle-like scale is detached before long, and its fall is announced by a feeling of tingling or pruritus. The scaly spots, having shed their covering once, enlarge rapidly, until they measure an inch and even more in diameter, but always preserving a circular shape. They are speedily again covered with squamæ, which are dry, glistening, somewhat opalescent, tough, and of a pearl grey or pale yellow tint. They are bounded by a rosy, or purplish, and slightly elevated margin, so that the centre of each patch appears somewhat depressed.

Lepra is very seldom seen exclusively on the hairy scalp. When it occurs in that situation, the squamæ are commonly yellow and furfuraceous; and want the glistening micaceous appearance which they present on the knees and elbows.

The spontaneous or artificial cure of lepra begins in the centre, and extends towards the circumference. After the detachment of the squamæ from the patches, the skin, when they are not renewed, first acquires a greyish tint with a shade of yellow; at a later period the ring which bounds the patches is narrowed progressively from within outwards, the circle breaks at length in one or more places, and the spot subsequently disappears entirely. Upon some regions, and in particular individuals, the squamæ of lepra remain of inconsiderable size, never exceeding a few lines in diameter: they also increase very slowly, and are but little prominent, rarely run into one another, are developed almost exclusively on the extremities, and differ from the patches of lepra vulgaris by the whiteness and small size of the squamæ: this constitutes the variety called lepra alphoïdes [A. 33.]; when the hue is livid, the disease is called lepra nigricans. [A. 34.] Lepra sometimes forms in arcs of circles a few lines in diameter, red, prominent, devoid of scales, and bounding surfaces of various extent, occasionally as much as five or six inches across; the enclosed skin rather healthy or yellowish.

b. Lepra *syphilitica.*

A variety of lepra forms the most common form of syphilitic eruption. It is characterized by a coppery colour, thin and soft squamæ, a tendency to ulcerate, and, on disappearing, to heal from the edges. [A. 35.] The spots are commonly of small diameter: they occur either singly, or in groups. In the axillæ and around the anus they become tuberculous, and discharge a moisture from their surface. [A. 36.]

2. *Psoriasis.* Solid inflammatory elevations of the skin, which change into squamous patches of different sizes, not depressed in the centre: the edges irregular.

a. Psoriasis *discreta.* Small distinct elevations, each from two to four lines in diameter, irregularly circumscribed, forming scales; sometimes of syphilitic origin.

b. Psoriasis *confluens.* Many elevations evolved so close together, that the squamous patches which succeed them meet and blend at their edges. They may extend continuously over a large surface.

Psoriasis *discreta,* on the trunk, is often combined with psoriasis diffusa of the extremities. The patches of psoriasis are characterized by the chapped lines which intersect them. [A. 40.]

c. Psoriasis *inveterata.* The primary patches no longer distinguishable. The skin of the entire body and limbs often involved in continuous psoriasis. The skin becomes hard, thickened, tense, and elastic; disposed at the natural folds to chafe and crack, and covered with a general incrustation of hard, dry, white scales. The joints are fixed by the rigidity of the skin. The quantity of desquamation in this complaint is sometimes enormous.

d. Psoriasis *gyrata.* The eruption disposed in curling lines.

Psoriasis *of the scalp*: the discrete form, the squamæ yellow and pulverulent.

Psoriasis *of the scrotum*. Psoriasis *palmaris;* one or more inflamed and desquamating patches, of an irregular outline, forming on the palm of the hand, and spreading from two lines in diameter to half an inch and upwards…………………	Sometimes syphilitic; in that case often combined with psoriasis of the tonsils.

Psoriasis *palmaris centrifuga,* in which ring after ring forms regularly beyond the surface last attacked. It is attended with troublesome pruritus. It is principally observed in washerwomen, and among coppersmiths, silversmiths, and tinsmiths. The variety of psoriasis, known by the name of *grocer's itch,* occupies the *back* of the hand, wrist, and fingers.

3. *Pityriasis.* An evolution of red *points,* and more frequently of red spots or patches, from which a mealy, or pulverulent, or foliaceous desquamation soon commences, and continues till the disease is cured.

§ VIII.—TUBERCULAR INFLAMMATIONS.

Tubercular inflammations are characterized by the occurrence of *tubercles,* or small, solid, circumscribed, indurated, and enduring tumours, which, after continuing for some months, often for several years, almost uniformly end by ulceration.

1. *Syphilitic tubercle.* Broad, red, inflammatory tubercles, forming at the alæ of the nose, or on the cheeks; after a time running into deep irregularly-excavated ulcers, which on healing leave disfiguring cicatrices. Syphilitic tubercles occurring upon the back and legs are harder, more prominent, and deeper; and of a violet or livid colour. After

maining stationary for some time, they inflame and suppurate, and are replaced by deep and foul ulcers.

2. I have met with three cases exemplifying uncommon varieties of simple tubercles, of which the two first occurred in habits tainted with syphilis. The third, with no suspicion of syphilis, went away under the use of mercury.

a. Soft, smooth, round tubercles, of a dull red colour, very prominent, of the size of peas [the complexion otherwise clear], scattered upon the chin. When pricked with a lancet they bled freely, and healed. They were not at any time squamous, or pustular, or ulcerated; but gradually subsided under the use of mercury, when sarsaparilla and other remedies had failed.

b. In a young man, after recovery from syphilitic lepra, treated with mercury, there formed, in three months, large, oval, soft, but solid tubercles upon the back and shoulders, at points where the leprous spots had been. Some of the tubercles were an inch in their long diameter: they were of a very light purple red: when punctured, they bled and healed. No other symptom was present. Mercury, arsenic, iodine, were tried in succession without any effect. Afterwards, in four or five months, these tubercles spontaneously disappeared. [A. 45.]

c. A respectable woman, about forty years of age, had a crop of tubercles slowly form upon one instep: they were from a third to half an inch in height and diameter. They were of a copper colour, soft, bled freely when cut through, and then healed. They disappeared with the internal use of mercury. Two or three, which I touched with potassa fusa, ulcerated: they shrank and went away with the rest. [A. 47.]

3. *Lupus.* — Two diseases fall under this head, which have not much alliance. The cases which I have witnessed have had the following characters.

a. Lupus *exedens.* Inflammatory tubercles forming at th alæ of the nose, ulcerating and scabbing, and capable being arrested by escharotics; otherwise spreading and d stroying the nose, the cheeks, the floor of the orbits, a penetrating the ethmoïd bone to the dura mater. T ravages not uniformly progressive: the ulcer sometimes spontaneously cicatrizing at parts of its surface. [A. 50.]

b. Lupus *non exedens.* Inflammatory tubercle, scaling and occasionally exuding serum and matter, commencing about the mouth and nose, and gradually spreading in a circle, the interior of which, or the part of the skin over which the lupus has passed, remains hardened, and like a cicatrix; the mouth contracting to a small rigid aperture; the soft part of the nose shrinking to two cicatrized holes; the tubercular circle spreading over the cheeks to the eyelids and causing ectropium, and to the temples.

4. *Scrofulous tubercle.*—Thickenings of the skin, inflamed, chapped, and ulcerated, occurring in persons of a marked scrofulous diathesis.

5. *Chimneysweep's cancer.* — A disease ordinarily beginning as an indolent warty excrescence of the scrotum. The skin is thickened and tuberculous: after some period, ulceration supervenes; and, as it spreads, a reddish-grey ulcerated surface is formed, and the nodular redness and thickening of the adjoining skin extends itself. The disease differs externally from true cancer in the doughy softness of the parts, which yield in some degree on pressure, and want the cartilaginous hardness of scirrhus: neither, if taken early and extirpated, has it an equal tendency to return. Chimneysweep's cancer is liable to commence in the skin and glands of the groin.

6. *Elephantiasis; lepra taurica.*—Chronic tuberculous disease, characterized externally by shining and oily-looking dark patches; to which succeed irregular, slightly prominent, softish, and at first red and livid tubercles, which by and by assume a dusky or bronze colour: these usually continue long indolent; they may terminate in resolution or ulceration. Their most common seat is the face, but they occur, though less numerously, upon the shoulders, buttocks, and limbs. They also often appear on the palatine arch; but the nose and ears, swelled and hideously distorted, are the parts of all others which suffer most frequently.

SECTION III.

I propose, in the present section, to enumerate different descriptions of ulcers in the following order: — 1. Primary syphilitic ulcers; 2. Secondary syphilitic ulcers; 3. Ulcers having other origins.

I. *Primary syphilitic ulcers* present four varieties.

a. A circular ulcer with raised edges, the base and edges soft, commonly preceded by a pustule.

A Frenchman consulted me for an ulcer corresponding with this description on the inner surface of the præputium, and for two large flat pustules on the body of the penis, which, breaking, assumed the same character. He took mercury, but irregularly, and the sores healed. A few weeks afterwards he returned, with a general eruption of copper-coloured spots four to five lines in diameter. On taking a proper course of mercury, he recovered.

b. A circular ulcer, raised above the level of the skin, without hardness.

A gentleman consulted me for a sore of this description on the præputium: its surface was of a grey colour, and flat, soft but firm; the edge neither raised nor hard: there was a fine red and vascular line round it. The black wash was applied, which seemed to irritate it. A saturnine and opiate lotion was then used, under which the sore healed in a fortnight, but left a hard cicatrix. Three weeks afterwards the cicatrix ulcerated: the sore so formed was level with, or very slightly below the adjacent surface; the surface red, without granulations. The black wash was again used, when the sore began to cicatrize from the edges and from the middle. Before the cicatrization was completed, a crop of copper-coloured spots appeared on the forehead, chest, hands, arms, and legs. Mercury was then given, when he recovered.

c. Excavated ulcer: the base and edge hard, as if formed of a cup of thin cartilage; commonly surrounded by a red vascular line; with little secretion. *Hunterian chancre.*

A middle-aged man became a patient of the Middlesex Hospital, with a sore of this description situated on the præputial surface adjoining the corona glandis. The sore had existed several weeks. A complete course of mercury was given; but the sore healed slowly and unwillingly, considerable general thickening of the adjacent parts of the prepuce and glans taking place: the cicatrix, however, was not indurated. Decoction of sarsaparilla with soda was now prescribed. In a little time one testicle swelled; and shortly afterwards, elevated copper-coloured eruptions made their appearance about the body. They were a quarter of an inch in diameter, collected in four or five close groups, with a few scattered ones in the neighbourhood of each group. Upon this the patient has resumed the use of mercury, and the spots, and the chronic inflammation of the testis are subsiding.

A young man had had an ulcer near the corona glandis, which had healed, and left a horny nodule of the size of a pea. He was in perfect health, but the nodule rather increased than lessened. It was much larger than any hardness that I had seen from imperfectly-cured chancre. I therefore passed a tenaculum through it, and with a lancet cut it out. The wound healed readily. In a few weeks a crop of copper-coloured spots appeared, which were cured by sarsaparilla and mercury.

d. An ulcer spreading rapidly in circumference and depth, the surface soft and yellow, with red points showing through the secretion, the base and edges soft: the edge of the skin red and inflamed, and often hard. *Phagedenic ulcer.*

The phagedenic ulcer, like sloughing phagedena (in which the appearance is only changed from that of a yellow lardaceous ulcer to that of an ashen slough), presents itself in two forms, the sthenic and the asthenic. In the former the habit is inflammatory, and the pulse strong and frequent: the latter occurs in feebleness and extenuation of the system In the former case, bleeding rarely fails to arrest the progress of the disease; in the latter, cauterization by nitric acid.

A patient, aged sixty-eight, of a hale constitution, became a patient at the Middlesex Hospital with a phagedenic ulcer of the glans. Mercury was given for three weeks.

the sore continued to spread, making its way under the puce, which became thickened. The patient was now mitted into the hospital; the mercury discontinued; and ter a few days, the thickened foreskin was divided; hen twenty ounces of blood flowed from the incision, in which an artery had been cut. The sore now put on over the greater part of its surface a healing appearance; at parts the phagedenic character remained: these parts were touched with strong nitric acid more than once; the ulceration then stopped, and the sore healed permanently.

This patient, however, was subsequently attacked with small oblong tuberculous inflammations on the arms, chest, and face, which ulcerated: he recovered under the use of iodine. He subsequently had iritis, which resisted the most active mercurialization, and periosteal swellings of the arm and forearm.

A gentleman, fifty-four years of age, had a phagedenic ulcer of the glans penis. It was healed with great difficulty, after repeated applications of nitric acid, the free division of the foreskin, a month's course of mercury, and iodine. He has since had glandular swellings in the thigh, the groin, and the upper part of the neck; at first indolent and slow, the skin gradually reddening, then ulcerating and sloughing, and exposing deep, foul, excavated wounds. On his face, one or two tubercular thickenings with superficial ulceration formed, as in the preceding case.

II. *Of secondary Venereal Ulcers.*

a. Circular superficial ulcers, spreading from three or four lines in diameter to two, three, or four inches; the central part cleaner, granulating; the edge of the ulcer yellow, with red points showing through the yellow surface; the edge of the surrounding skin raised and red.

A patient, who had taken mercury for secondary syphilitic disease, came into the Middlesex Hospital with a ulcer of this description on the instep: upon his legs, ar and face, there were leprous spots, which on the face w and tuberculous, and on the limbs crusted with th white squamæ: these successively ran into ulcers corresponding to the description. Iodine has been of singular efficacy in this case. [A. 60.]

b. Narrow ulcers, with a yellow surface, and sharp irregular margin, the skin around red and tumefied.

A patient, who had been long treated for secondary syphilitic symptoms, had a puffiness on the forehead, and at the eyebrow, and on the lower eyelid. The skin at these parts gradually became red and thickened, and then ulcerated; the ulcers had the appearance described above. [A. 65.] This affection bears a close relation to, or is identical with, the syphilitic tubercle described in page 259.

c. Narrow ulcers spreading as segments of circles, leaving in their hollow a healed and cicatrized surface: the spreading edge of the ulcer yellow with red points, alternating sometimes with a livid hue: the edge of the skin adjoining the ulcer raised and red.

A lad was a patient in the Middlesex Hospital, with syphilitic ecthyma, followed by nodes on the tibia. The pustules were large and flat, with little redness round them. They left ulcers, which in their progress assumed the character above given. The same form of ulcer sometimes follows venereal tubercle on the trunk, arms, and legs.

III. *Ulcers proceeding from other sources*, may be thus arranged.

a. Healthy ulcers. The surface covered with small, pointed, florid granulations, rising a little above the level of the surrounding skin, the edge changing into soft, whitening cicatrix: the secretion, healthy pus.

b. Indolent ulcers. The surface sunken, pale, with yellowish and grey imperfectly organized granulations, or with none; the edge raised, thick, white: secretion of pus, small in quantity. The ulcer is sometimes deeply excavated.

c. Inflamed ulcers. The surface red, at parts of a remarkably dark crimson, with streaks of effused blood; the skin around, hot and red; the secretion thin and sanious. Irritable ulcers are a modification of this kind; the inflammation less; parts of the ulcer often of a greenish colour.

CHAPTER [illegible]

THE DIGESTIVE ORGANS.

THE pathology of the digestive organs will be considered under the following heads:—fauces, salivary glands, and nasal cavities; pharynx and œsophagus; stomach; small intestines; great intestines; peritoneum; hernia; liver; pancreas; spleen.

SECTION I.

Fauces; Salivary Glands; Nasal Cavities.

I. The fauces comprehend the tongue, the gums, the cheeks, the tonsils and soft palate, and the lips.

A. The different appearances of the upper surface of the tongue in health form three varieties.

1. The surface of a reddish grey, moist and soft, conoid papillæ distinct:—the common appearance in children and adults. 2. The surface inclined to roughness, with a thick and semi-opaque epithelium, conoid papillæ indistinct:—not unfrequent in men. 3. The surface red, as if raw, and firm, traversed by irregular fissures: conoid papillæ not distinguishable:—frequent in elderly persons of both sexes.

The morbid conditions of the tongue are more numerous.

a. The state of the surface changing with the state of health furnishes important pathognomonic signs; the value of which, however, is more in their successive alterations than in the appearance presented at any single period: there are varieties in the appearance of the tongue in the same disease, as well as in perfect health, that are dependent upon idiosyncrasy. The differences observed are in the degrees of thickness of the epithelium, and in the character of the secretion covering it.

Debility, caused by disease without fever, produces the following change: the epithelium disappears; the tongue is soft, red, raw, cleft, and unusually sensible; or, feverishness supervening, becomes dry and glazed.

The epithelium sometimes becomes opaque, thick, rough, like a blanket. The most remarkable instance of this variety that I have seen, occurred in a strong, middle-aged man, who laboured under an obscure rheumatic or nephritic attack.

When the stomach is foul and the system heated, the upper and back part of the tongue is covered with a thick, brownish, viscid secretion, which may be scraped off, leaving the epithelium opaque and white.

Mercury produces a thick, white, viscid secretion upon the upper surface of the tongue, which is easily scraped off. If salivation is present, the sordes are washed off by it, leaving the tongue moist and flabby, and flattened by the teeth at the sides. The tongue is liable to become swollen through mercurial action; I have seen the swollen tongue protrude beyond the teeth, requiring to be mechanically forced back, to prevent its strangulation.

At the commencement of inflammatory fever, the tongue is covered with a brown secretion, which, when scraped off, is rapidly reproduced: towards the edge, the secretion is whiter. Both the morbid secretion and the epithelial thickening in general occupy the middle of the dorsum of the tongue, and diminish towards the tip and edges. It is again the middle of the same surface which becomes dry in fever, the dry part often having a definite edge. The drying of the middle part is assisted by the air in breathing passing over the middle of the tongue; the sides and tip are kept moist through contact with the gums, and their vicinity to the openings of the salivary ducts. The cleaning of the tongue commences upon the edges.

Sometimes in febrile disorders — in acute rheumatism for instance — a streak of fur is seen on each half of the tongue, the middle being clean and glazed.

In typhoid fevers, the tongue covered with sordes becomes black and dry.

In scarlet fever the tongue is at first white, the vascular fungiform papillæ showing red through the white secretion: on the eruption declining, the tongue cleans, and becomes wholly of a bright scarlet.

In a gentleman between sixty and seventy years of age, who had abscess in the prostate, and became in three or four months from a stout man thoroughly emaciated, the tongue was constantly covered with a thick, moist, coherent, greenish-black secretion, which adhered to the surface with great tenacity.

b. Aphthæ, a vesicular eruption upon the tongue, palate, and pharynx: common in children: occasionally occurring in adults: frequently combined with gastric and intestinal irritation and ulceration.

c. Psoriasis of the edges and sides of the tongue is characterized by patches of whitish, sore, excoriated surface, about half an inch in diameter. It is most common where slight degrees of syphilitic taint exist, but it occasionally occurs in cachexia from no specific cause.

d. Hypertrophy of the mucous membrane. A lad is at present under my care, as an out-patient of the Middlesex Hospital, with this complaint. It has existed three years. The middle half of the left side of the upper surface of the tongue is the part affected; it is elevated to the height of a quarter to a third of an inch where it is thickest. The prominence is not uniform, but towards the back part is divided by two or three fissures into separate eminences. The surface is soft, moist, and of a reddish grey, but has more of grey in it than the opposite side of the tongue. There is no pain or soreness of the part, or sense of taste in it. The swelling lessened under the daily application of *hydrargyrum cum cretâ*, and shrank a little upon two or three applications of the nitrate of silver. The first was discontinued, when it affected the mouth; and the lunar caustic, because it began to irritate. I have prescribed nothing recently for the part, as the patient has phthisis.

Circumscribed tumours sometimes form upon the surface of the tongue, which are probably partial hypertrophy of the mucous membrane. They may be removed either with scissors, or with the ligature.

e. Hypertrophy of the substance of the tongue. This affection has been already described at page 114.

f. Inflammation and suppuration of the substance of the tongue. The tongue swollen and painful, so as to obstruct deglutition and breathing; at last communicating a sense of fluctuation on pressure: the distress relieved, when the abscess is opened.

g. A peculiar disease of the tongue was met with in a boy by Mr. Earle. Clusters of very minute transparent vesicles pervaded the whole thickness of the tongue, occupying nearly one half, and projecting considerably both on the upper and under surface. The slightest injury caused them to bleed profusely. In some places the clusters were separated by deep clefts, which discharged a fetid, irritating sanies. This disease, which had resisted various plans of treatment both local and constitutional, gradually yielded to quiet, cleanliness, and large doses of hyoscyamus, which were increased to a drachm of the extract daily.

h. Ulcers. The tongue is liable to several forms of ulceration. A young woman was seen by me, with Mr. Parsons of New Cavendish Street, with two shallow flat ulcers on the left side of the upper surface of the tongue: the substance of the tongue around the ulcers was hard and thickened; the tongue foul, with whitish secretion; the gums spongy, and disposed to ulcerate at their dental edge. The complaint had existed five months; about the middle of which period it had got well under the use of the liquor arsenicalis, with occasional aperients. This medicine was again tried, when one of the ulcers healed; but the other spread, putting on the appearance of the secondary syphilitic ulcer described at *a*, p. 267; and a patch of psoriasis formed on one eyebrow.

Foul excavated ulcers of the tongue, with induration, I have seen put on a healthy character, and get well under mercury and sarsaparilla, joined with the local use of hemlock.

i. Cancer. True carcinoma, originating in the tongue, commences with tubercular induration: the ulcer which follows is excavated; its surface foul, or red; the base and surrounding substance hard as cartilage; the edge thickened and contracted, part inverted, part everted; pains shooting and lancinating; the neighbouring lymphatic glands gradually becoming affected. In the progress of cancer, here, as in other parts, sudden hemorrhage is liable to supervene from an artery or vein giving way. The actual cautery is the best remedy for this bleeding.

B. *The Gums.* The gums are liable to become soft, spongy, and disposed to bleed, in scorbutic habits; to become red and swollen, and finally to ulcerate at their dental edge, when the system is loaded with mercury; to become indurated by the spread of cancer from the lip. They are further liable to the following specific malignant disease.

Epulis. The gum enlarged and redder than natural, growing in parts over the sides of the teeth in irregular processes, and at the same time ulcerating. This state of the gum is commonly found around one or two decayed teeth. The cure for it is the removal of the decayed tooth or teeth, and the excision of the whole of the diseased portion of the gum. If a part is left, the disease returns, and requires a fresh operation.

C. *The Cheek.* The inner surface of the cheek becomes swollen during an excessive use of mercury, and is liable to ulcerate against the edges of the molar teeth.

Ulceration of the cheek, again, is liable to take place from foulness of the stomach and bad teeth. In some persons with decayed molar teeth, a cold is often attended with abscess of the cheek, that should be opened from within.

Vascular tumours are liable to form upon the inner aspect of the cheek. A young woman, who three years before had first remarked a fulness of her right cheek, was sent to the Middlesex Hospital by Mr. Lipscomb, of St. Alban's, in April 1835. The swelling gradually increased, but was unattended with pain. It was produced by a circular vascular tumour, covered by the mucous membrane of the fauces, somewhat more than an inch in diameter, and half an inch in height: at times it was more full and prominent. The surface was mottled, as if a cluster of veins of the size of peated hemorrhage from the posterior fauces in sloughing venereal ulcer, I tied the common carotid with success. The patient between three and four years afterwards was admitted into the Middlesex Hospital, in the last stage of consumption; through which circumstance the parts identifying the lingual artery as the source of the hemorrhage came into my possession. [*s.* 51.] The use of mercury sometimes gives rise to ulceration of the tonsils.

E. *a. The soft palate,* liable to common inflammation, syphilitic psoriasis, syphilitic ulceration and sloughing, like the tonsils, is often left after the latter complaint with a large perforation through its centre, which I have seen an inch in length and half an inch in breadth. Ulcerated holes of this description, when the specific action has been subdued, will in every case draw together and close, if the edge is prevented cicatrizing by the use of escharotics. Sometimes nearly the whole of the soft palate is destroyed, at the same time that the posterior surface of the pharynx is attacked with sloughing or ulceration. In this case a singular restoration takes place; the remaining flap of soft palate adheres to and forms one cicatrix with the back of the pharynx, leaving two small cicatrized apertures into the nostrils. The restoration thus accomplished is sufficient for deglutition, but not for the voice. The flap so stretched behind the posterior openings of the nostrils prevents the food in the act of swallowing getting into the nose; but it does not prevent the air passing in speech through the nostrils, so that the voice has always a nasal quality.

b. In weakly infants sloughing of the soft palate, of the lips and cheek, occasionally supervenes. It is commonly fatal.

c. The soft palate is liable to *congenital fissure.* In this case there is no deficiency of substance, but the raphe is ununited; the halves of the soft palate hang receding from each other at an angle of about thirty degrees. The voice is nasal, and the articulation of several letters imperfect. The infant is unable to suck, being incapable of exhausting the air from its mouth. When grown up, the patient learns to swallow tolerably perfectly; for the action of the circumflexus palati becomes gradually strengthened and improved to that degree, that in the act of deglutition the lower half of the sides of the halves of the soft palate and uvula are brought towards each other so as nearly to meet. This I observed in the first case in which I operated for fissure of the soft palate; and calculated that it would contribute to support the sutures during deglutition. The case to which I refer did favourably, but the upper half only of the surfaces united by the first operation; a second was necessary for joining the lower half.

The method which I recommend for this operation is, first, to remove the edges of the fissure with a cataract knife and curved scissors; secondly, to pass silk ligatures, the first near to the hard palate, tying *that*, and *each*, before the next is introduced: the next is thus introduced all the more easily. The operation should not be done in childhood. In two children, one eight, the other eleven years of age, in whom I performed it, it failed. The cause of failure in children is the narrowness of the entire soft palate; from which it follows, that if the ligatures are passed sufficiently far from the cut edge to hold, there is not left on their outside breadth of substance enough to stretch easily to the extent required: the ligatures therefore have to be drawn with such tightness as causes them to cut themselves out in forty-eight hours, leaving the parts ununited.

d. Polypi sometimes grow from the soft palate.

A Spanish gentleman consulted Sir Astley Cooper for a polypous excrescence of the colour of the mucous membrane of the fauces, which grew from the fold over the palato-pharyngeus, and hung down like a sausage into the pharynx. By great efforts he could regurgitate it into his mouth. Sir Astley Cooper passed a ligature round the root of the tumour, which separated in eight days. A second was removed by Sir Astley, similar to the former in appearance, but not quite so large, which grew more from the root of the tongue. Both cases succeeded. — *Cooper's Lectures, by Tyrrell.*

E. *The Lips.*

a. A lady and her infant suffered at the same time with a similar attack: the lips and cheeks were swollen; and patches of inflammation occurred upon the mucous surface, which formed painful oblong ulcers. The infant recovered in two or three weeks. The mother suffered for several months. Iodine appeared to have more control than any other medicine on the complaint.

b. When the orifice of one of the labial glands becomes accidentally closed, mucus accumulates in it, converting it into a tense encysted tumour. It should be punctured, and a small piece of the cyst cut out, so as to leave a permanent opening.

c. A middle-aged woman was an out-patient of the Middlesex Hospital upwards of a year. A part of one side of the upper lip, for the extent of a square inch, was full, thick, and red, mottled with streaky vessels. This complaint had supervened gradually. It had made no progress, when I lost sight of her.

d. Cancer of the lip has been already noticed at page 49.

e. Hare-lip is a parallel defect to congenital fissure of the soft palate. It is generally single, sometimes double. In the latter case, the central part, if disposed to project, should be removed; otherwise it should be united by one operation to the two lateral portions. The pins may be removed on the third or fourth day. I operated, in the presence of Mr. Travers, for hare-lip in a child thirteen years of age, on whom the operation had been twice performed without success. On the fifth day, till when *in this case* I delayed removing the pins, organized union certainly had not taken place; but the edges were yet raw, and had a gelatinous adhesion: by keeping them together with sticking plaister, they united.

II. *Of the Salivary Glands.*

a. Cynanche parotidæa. An infectious inflammatory complaint, taken but once in life, attended with considerable symptomatic fever, and painful swelling of the lower part of the face, consisting in inflammation of the salivary glands.

b. Ranula. A large cyst containing mucus, situated under the side of the tongue, and covered by the mucous membrane of the mouth; supposed to be a dilatation of the duct of the submaxillary, or of one of the ducts of the sublingual. The best practice is, having opened the cyst, to pinch up a small portion of it with forceps, and cut it out. The fluid then continues to flow through the opening.

c. Medullary sarcoma is liable to originate in the parotid gland, or in a lymphatic gland embedded in it. The removal of the gland is useless.

d. Vascular subcutaneous nævus often occurs towards the angle of the jaw, involving the parotid and sometimes the submaxillary gland.

In one case of this affection, in a healthy infant a few months old, I applied a ligature, which was tied round two strong pins passed at a considerable depth through the parotid. The part that was strangulated came away, and the wound healed; but the vascular growth had not been extirpated, and the disease returned.

In another infant, in which the disease was still more extensive, I first passed setons through the parotid without advantage, and then tied the common carotid artery. The temporary effect of the second operation was considerable; but after two months, the vascular structure became again distended, and on the increase: secondary hemorrhage took place through an unhealed sinus leading to the point where the artery had been tied, and the child shortly afterwards sank. If a similar case again presented itself in a strong and healthy infant, I should be disposed to tie the external or common carotid, and to extirpate the tumour, at one operation.

III. *The Nasal Cavities.*

A. *a.* The pituitary membrane is the common seat of inflammation from exposure to cold. Chronic defluxion from the nose, with sense of stuffing and fulness, occasionally attends cerebral congestion.

A gentleman of a remarkably large person, fifty-five years of age, when dressing in the morning, dropped in a state of insensibility: after lying, how long he does not know, upon the floor, he recovered; but he experienced, for a day or two, pain in the head. Three years afterwards, having in the mean time been in perfect health, he again experienced pain in the head, with disturbed sleep: every morning he awoke heated and unrefreshed, the nose stuffed, with much defluxion. After these symptoms had lasted some weeks, he was cupped to twenty ounces on the back of the neck. The symptoms, all but the defluxion from the nose, then went away, and *that* was much ameliorated: afterwards, by purging, and the use of the sulphur-bath twice a week, this symptom disappeared.

b. In children, a perpetual and troublesome defluxion of transparent mucus of a peculiar odour occasionally occurs, which lasts for years, and is with great difficulty repressed by the use of astringents.

c. Epistaxis. Hemorrhage from the exhalant vessels of the nose is a symptom of either general or local fulness, or of general debility and vascular atony. In the first case it may give relief; as, for instance, in the yellow fever, or in an apoplectic habit: in the second it may be injurious, and require to be mechanically suppressed. The mechanical suppression of epistaxis is easily accomplished by stopping the nostrils at once from the soft palate and from the nose.

d. The pituitary membrane is liable to be thickened over a greater or less extent, secreting viscid mucus causing nasal obstruction. In one case, I broke off, with polypus forceps, a portion of the upper turbinated bone, on which the membrane was thickened. The patient, a young lady, felt no uneasiness afterwards, and was quite relieved.

e. Common polypi. Thin, smooth, elongated, pendulous tumours, of a greenish-white colour, slightly transparent, and of a gelatinous softness, which grow from the pituitary membrane covering the turbinated bones. They require to be pinched off at their roots with polypus forceps. They have a strong disposition to return, which may be obviated by applying escharotic or astringent lotions to the surface, from which they have been removed.

f. Hydatid polypi. Collections of mucus contained in pendulous membranes, resembling wetted bladders, hanging within the nose like the preceding, unattended with pain, but producing obstruction of the nostrils. When pressed with forceps, they burst, and discharge mucus. The cysts may be removed by the forceps; but they grown again, unless checked by astringent applications to the surface. Their origin is probably the obstruction of the orifice of one or more of the mucous follicles of the pituitary membrane.

g. Fungoïd polypus. A young gentleman consulted

Sir Astley Cooper for a large purple excrescence projecting from the nostril, which completely obstructed the passage on that side. There was a copious discharge of sanious fluid from it; but the disease was little painful, and the general health was at first but slightly affected. Sir Astley Cooper passed a ligature round the highest part he could reach towards the root of the tumour, which sloughed away without hemorrhage. The patient appeared to be greatly relieved; but some time afterwards the disease returned, and was again removed. It grew again, and ultimately destroyed life. The head was examined, and the disease was found to have grown from a very small surface of the pituitary membrane.—*Cooper's Lectures, by Tyrrell.*

h. *Syphilitic ulceration* is liable to commence upon the septum narium, through which it eats. The fore part of the septum being destroyed, the cartilaginous part of the nose sinks down and is flattened. Dieffenbach, in cases of this deformity, recommends the cutting down upon and removing a portion of the ossa nasi, so as to give a straight outline to the profile of the nose. The cartilages of the nose are liable to be eaten away by venereal ulceration commencing in the integuments. The turbinated bones are liable to be the seat either of syphilitic or strumous caries, attended with discharge of matter from the nose, and exfoliation.

B. *The antrum.*

a. Inflammation of the mucous membrane not depending upon evident local causes. A young man complained of excessive and constant pain in the left maxillary antrum. There was some degree, but not much, of tumefaction of that side of the face; tenderness in the situation of the antrum everywhere; the pain aggravated by pressure. In addition to these local symptoms, there was a good deal of general febrile excitement. The disease had existed and been on the increase for two or three weeks. Sir Benjamin Brodie opened the antrum *by perforating it,* after dividing the membrane which covers the jaw bone just above the alveolar processes of the molar teeth, *with strong sharp-pointed scissors used as a chisel.* No fluid, however, of any kind escaped.

The patient was then ordered to take two grains of calomel and half a grain of extract of opium three times daily. In about three days the gums were a little sore, the pain began to abate, and at the end of three or four days more the symptoms had entirely subsided.

b. Necrosis of the antrum from injury. A person was admitted into St. George's Hospital, who eight years before had fallen on the pavement, and bruised his nose and the whole left side of his face. Ever since he had had pain of these parts.' The left side of the face became swollen, the pain increased, and matter was discharged from the nostrils. Matter also occasionally made its way through one of the alveoli of the superior maxillary bone. After dividing the membrane covering the outside of the antrum, the probe introduced appeared to come in contact with dead bone. The antrum was opened, when small fragments of dead bone were felt, some of which were extracted. On the following day, other small portions passed through the nose.—*Brodie.*

c. The ordinary cause of inflammatory disease and suppuration in the antrum is caries of a molar tooth. The symptoms are, pain in the situation of the antrum,—acute when matter is pent up,—œdema and inflammatory discoloration of the cheek; in some cases occasional discharge of matter from the nostrils. The disease is slow in its invasion and course: it is often attended with partial necrosis. The local treatment consists in establishing a sufficient opening into the antrum, which may be afterwards plugged, and the plug removed and the cavity syringed when necessary: the opening is to be made in the manner described above, unless the extraction of a carious tooth has left a free channel into the cavity.

d. Collection of transparent fluid in the antrum. A lady had a large projection of one cheek, looking as though she had a plum in her mouth. On holding up the cheek, a projection was seen in the situation of the antrum as large as a pigeon's egg. The surface, where it was covered by the mucous membrane, gave way a little under the pressure of the finger. There was no distinct fluctuation, but a kind of crackling sensation was communicated to the fingers, as if you pressed upon very thin bone or dry parchment. To open this tumour, Sir Benjamin Brodie used a strong curved scalpel bent upon the flat, introducing the point into what seemed the thin bony parietes or boundary of the tumour: immediately there escaped a large quantity of transparent fluid like very thin mucus, something like that in ranula. The cavity being examined with a probe, proved to be enormously dilated, but did not contain either dead bone or a tumour. The opening was then enlarged, by the removal of a circular portion of the thin bony shell of the expanded antrum. After the operation, the tumour subsided; and in the course of a few weeks the cheek was not larger than the other. The aperture made by the scalpel has continued pervious to this day, though it is ten years since the operation was performed. The lady wears a plug, which she takes out night and morning, and with her own hand introduces the point of a syringe, and washes out the antrum.

e. Malignant tumours of the antrum. Of these, the commonest are medullary sarcoma [*q*. 10.] and osteo-sarcoma; of which the former originates in the mucous membrane, the latter in the bone. In the progress of either disease, the cheek becomes frightfully swollen and prominent, the integuments ulcerate externally, the mucous membrane gives way towards the nostrils, and the patient gradually sinks. It is peculiarly important to distinguish between these two complaints. The removal of the former is probably never successful; while that of the latter, if the operation is performed sufficiently early to allow of the excision of the whole, ought to be permanently effectual. The only criterion that I am acquainted with for determining the nature of the swelling, is to plunge a lancet into it; when, if the disease is osteo-sarcoma, the peculiar crisp sensation of cutting that texture will be perceived.

I have known medullary sarcoma commence in the membrane of the palate, and spread upwards into the antrum by absorption of the bone. [*q*. 15.]

SECTION II.

Pharynx and Œsophagus.

A. *Pharynx.*

a. The difficulty of deglutition, which is a common feature of cerebral and spinal disease, results from complete or incomplete paralysis of the pharynx and œsophagus.

b. The pharynx is frequently the seat of syphilitic ulceration and sloughing, which extends to that part from the tonsils and soft palate. See page 270.

c. Common inflammation and suppuration are liable to occur in the membrane of the pharynx and the cellular tissue external to it. In a patient of Dr. Watson's, in the Middlesex Hospital, after sore throat, an abscess formed external to the pharynx, in which the cornu of the os hyoïdes lay carious, and the lingual artery became ulcerated. The abscess had both an outward and a pharyngeal opening; the latter was nearly half an inch in diameter, and situated just above and to one side of the aperture of the glottis. This patient died suddenly, being suffocated by a sudden gush of arterial blood, which filled the windpipe, and choked him. [*s.* 50.] Suffocation sometimes takes place from inflammation of the mucous membrane at the root of the tongue and pharyngeal margin of the larynx, with suppuration under it. The latter case will be again adverted to, in connection with disease of the larynx.

d. Acrid liquids produce two effects upon the pharynx. The slightest degree, is the detachment of the cuticular lining [*q.* 20.]; the greater, effusion of lymph [*q.* 30].

e. Solid bodies are liable to stick in the pharynx. They may commonly be extracted either by the finger, or with the assistance of long curved forceps. A small pointed substance, as a fish-bone sticking in the pharynx, is best removed by swallowing large mouthfuls of chewed bread, which first detach it, and then sheath it in its descent. After the removal of a sharp-pointed substance, the part remains sore for some hours, as if the irritant were there still. The principal danger from foreign bodies in the pharynx is immediate suffocation, either through the mechanical obstruction of the opening of the windpipe, or spasm. A large morsel hastily bolted, a clot of blood even, has thus proved fatal. If the foreign substance cannot readily be extracted, and suffocation threatens, laryngotomy should be performed without delay.

f. The pharynx is liable to become sacculated at its junction with the œsophagus, a blind pouch being produced from it either behind or to one side of the gullet. In this disorder the evil is aggravated by each meal; part of which is forced into the sac, and by its pressure contributes to extend it.

g. Scirrhus of the pharynx I have seen in two forms: one, a large hard fungus growing from the laryngeal surface of the pharynx, gradually obstructing the passage, and producing death by inanition [*q*. 25.]; the other, several small scirrhous tubercles on different aspects of the pharynx, causing spasmodic difficulty of swallowing. [*q*. 26.]

Dr. Monro gives a case of polypus growing from the forepart of the pharynx, which, on the patient retching, was thrown forward into the mouth, and was so long as to touch the front teeth, but otherwise lay in the œsophagus.

h. Simple but fatal ulceration sometimes takes place at the lower part of the pharynx. [*q*. 23.]

B. *Œsophagus.*

a. Spasmodic difficulty of deglutition,—Spasmodic stricture. This affection is produced by a variety of causes.

A young man applied to me, at the Middlesex Hospital, for relief of difficulty of swallowing: he could get down liquid food only, and that not without an effort. A bougie being introduced, some resistance was found at the upper opening of the œsophagus, but it yielded; the resistance was spasmodic, and depended upon the irritation caused by ulceration of the interior of the larynx. The use of the bougie a few days, joined with appropriate remedies to the larynx, removed the difficulty of swallowing.

A gentleman, about sixty years of age, consulted me for spasmodic stricture of the œsophagus. On a sudden, at dinner, he used to be seized with a sense of stoppage in the throat; he felt as if choked by what he attempted to get down, and was compelled to discontinue his meal. I passed a large œsophagus bougie into his stomach without finding any obstruction. I prescribed for him an alterative course of blue pill, combined with warm aperients. He has had no return of the attack. A brother of this gentleman, who has lived freely, and suffered severely from gout, had at one period of his life similar seizures.

A lady consulted Sir Benjamin Brodie, who was unable to swallow the smallest morsel of solid food, and swallowed liquids not without great difficulty. The symptoms had been coming on upwards of three years. A full-sized œsophagus bougie being introduced entered the stomach without meeting the slightest impediment. This lady's face was pale and bleached, her feet œdematous. She had long laboured under internal piles, from which repeated discharges of blood had taken place. Under the use of remedies which relieved the piles and the bleeding, the difficulty of swallowing went away.

A female between fifty and sixty years of age consulted me for difficulty of swallowing, attended with a sense of obstruction and uneasiness in the œsophagus at the lower part of the throat. She could only swallow liquids or sopped bread; the obstruction or difficulty appeared to her always to occur at the same point. I passed a middling-sized bougie, without meeting with any impediment, into the stomach. On further inquiry, I found that she laboured under symptoms of inflammation of the peritoneal covering of the liver; and the treatment which removed this complaint, took away the spasmodic difficulty of swallowing.

b. Rupture of the œsophagus. Baron Von Wassanaer, healthy, robust, but subject to attacks of gout, was accustomed to take an emetic every time he thought he had eaten too much. His stomach being out of order on one occasion, after a day of abstinence that followed on a preceding excess, he remarked, that he felt something disagreeable at the upper part of his stomach, which he proposed to wash away (as he had often successfully done before) by swallowing three or four cups of carduus benedictus tea, and exciting himself to puke. While endeavouring to vomit, he suddenly cried out with sudden and excessive pain, and declared that he had burst something at the upper part of his stomach, and that the anguish was so great that he must be near his last hour. The pain did not relax a moment, but gradually spread to his back and through every part of his breast. When he felt an inclination to eructate, or tried to sit upright, the pain was aggravated. He was taken at nine in the evening, and died at nine the following morning. The œsophagus was found to have been torn asunder a little above the cardia; and there was a rent an inch and a half long through the pleura, forming the left boundary of the posterior mediastinal cavity, that had allowed the escape of the contents of the stomach into the left cavity of the chest, in which the lung lay collapsed and compressed. — *Boerhaave.*

c. Foreign bodies in the œsophagus. If a large or angular and pointed solid substance is swallowed inadvertently, and passes the cervical portion of the œsophagus, it commonly makes its way into the stomach, although cases have been known to the contrary. The œsophagus does not become narrower in its descent. The resources, when a foreign body is fixed in the cervical portion of the œsophagus, are its retraction, excision, or detrusion into the stomach. The preference of either of the three methods must be determined by the nature of the obstructing body. If œsophagotomy is requisite, it should be performed without delay; which, if indulged in, turns the scale — as I have seen it happen — against the patient.

d. Effects of corrosive liquids. The effect of corrosive liquids on the œsophagus is to produce in the lowest degree separation of the cuticle [*q.* 28.], in a higher degree effusion of lymph [*q.* 30.], in the highest, sloughing of the lining membrane to a greater or less extent; which, being thrown off, leaves a granulating surface, that cicatrizing, contracts and narrows the canal, establishing permanent and fatal constriction. A most remarkable case of this description, which I witnessed, was under the care of Dr. Wilson in the Middlesex Hospital. [*q.* 33. *q.* 34.]

Hannah Powers, aged twenty-one, was admitted on the 4th of January, 1834, at eleven o'clock at night, half an hour after she had swallowed about a table-spoonful, as she supposed, of oil of vitriol. There were marks of the action of the acid on her chin, where it had destroyed the cuticle; also on the fore-arm and fingers of the left side. The parts thus injured were of a dark colour. She was restless, and almost incessantly retching and bringing up a dark reddish-brown fluid. She stated, that, upon swallowing the poison, she was instantly seized with vomiting. There appeared to be extensive abrasion of the membrane lining the interior of the mouth, and of the tongue: both these parts were white, apparently from magnesia taken before she was brought to the hospital. Two hours after her admission, her lips began to swell; and she complained of much pain in the throat, in the course of the œsophagus, and in the stomach, with a sensation of constriction and choking about the pharynx; and her voice was greatly affected, and at length was reduced to a whisper.

Two days afterwards, she began purging a thick ropy mucus resembling boiled isinglass: this continued for a week, and ceased gradually. It was attended with some general pain of the abdomen. On the 11th, having previously vomited some membranous shreds, she was attacked with an unusually violent fit of coughing and choking, and appeared to be in danger of immediate suffocation. Mr. Lonsdale, then house surgeon, who was called to her assistance, perceived a long, white, flocculent mass hanging out of her mouth, which he took hold of, and then drew from the throat; it appeared to be an almost entire slough of the membrane lining the œsophagus, having ragged extremities. Some of the circular muscular fibres of the œsophagus were plainly visible on the exterior of the tubular slough. She suffered much pain after this along the course of the œsophagus, especially whenever she swallowed: but, upon the whole, her sufferings diminished from that period. At the time of her admission it was found impossible to get any thing down her throat, except a little gum, or honey, or thick arrow root; and these seemed to be of some use in lubricating and soothing the parts. Leeches were applied in large numbers and frequently along the course of the pharynx, œsophagus, and stomach. She was bled also during the first four days to upwards of thirty ounces.

She mended slowly after the expulsion of the slough, and was able by degrees to get down more nourishment; but was often checked for twelve or fifteen hours together by incessant sickness, and a discharge of tough, ropy, frothy mucus. The weather had a marked influence upon her: she was much more free from pain and sickness during warm, dry, and clear weather, than when it was moist, cold, and foggy. She always suffered pain during the descent of food and drink into the stomach; and pointed to the upper bone of the sternum as the part behind which the most uneasiness lay. She became able to take soft eggs, beef tea, wine, ale, and porter; and she mainly subsisted on these things, and really gained some flesh by the summer, and went out of the hospital very much recovered.

She was readmitted in September of the same year, and improved greatly in health and spirits, and gained flesh, taking an abundance of sops and the nutriment already mentioned. But on the 14th of November, at five in the morning, she was suddenly seized with severe rigors and sickness, and her countenance altered greatly, and assumed a death-like appearance. In the course of the day pain came on over the general surface of the body, so that (as she expressed herself) not an inch of her frame was free from exquisite soreness: the wrists, and in a less degree the other joints, became painful and swelled, but were not red: towards night she became covered with a clammy warm sweat; and from that time till her death, at seven p. m. of the 17th, nothing whatever was received into the stomach. The only thing which seemed to relieve her was lumps of sugar saturated with laudanum placed upon the tongue. Towards the close, she did not complain of any particular pain. She survived, after swallowing the acid, forty-five weeks and three days.

Inspection.—The œsophagus for the lower two-thirds was thickened and narrowed, the inner surface an irregular cicatrix. There was an opening in the fundus of the stomach of the size of a crown-piece, the edges of which were soft and flocculent; a large quantity of dark fluid was found in the abdomen. It was thought doubtful, whether the perforation of the stomach had not preceded death. [*q.* 34.]

e. Dilatation of the œsophagus. Mary Blores, ætat. thirty-three, was admitted into the Middlesex Hospital, November 16, 1829, in a state of extreme debility and emaciation, produced by her constantly throwing up the food she took. She swallowed liquids more easily than solid food. When she took a small quantity of fluid, it seemed to her not to reach the stomach, and in three or four minutes was invariably rejected. On taking a large draught, she thought that it reached the stomach: in this case vomiting did not follow so soon, and some part of the draught was permanently retained. She craved for food and drink, and seemed literally dying of starvation. The vomiting was not preceded by nausea, although in its progress it had the appearance of ordinary retching. The matter vomited was not thrown up at once, but by successive efforts: it consisted of the food she had last taken, mixed with colourless mucus. The complaint, she said, had begun ten years ago, during pregnancy; since when she had never been free from it, although at times her sufferings had been less, and she had been able to retain some portion of her meals. The belly was so shrunk, that the umbilicus was not more than an inch distant from the spine: there was no enlargement or hardness about the stomach, no particular tenderness on pressing the epigastrium, or general sense of heat or uneasiness there. This patient died sixteen days after her admission, utterly extenuated.

Inspection.—The stomach was small, and contracted at its middle to the breadth of an inch and a half. The upper part of the duodenum was but half the ordinary size of the ileum. The œsophagus from its junction with the pharynx, which was perhaps rather less capacious than usual, enlarged to an extraordinary degree of dilatation. The greatest breadth which it attained (exceeding two inches and a half, when distended) occurred about four inches above the cardia: the tube then narrowed more abruptly, so as to render the cardiac termination, like the pharyngeal, of nearly the usual dimensions. The structure of the cardiac end for about an inch, and that of the pharyngeal end for about an inch and a half, were healthy. Intermediately, the lining tunic was thickened and opaque; the mucous membrane had the appearance of having yielded or opened into flat shallow depressions, which above followed a longitudinal direction, below formed irregular pits. At the depressed surfaces, the membrane had the natural colour; between them, it was opaque and whitish. The muscular fibres were of the natural colour and thickness: they had grown with the expansion of the canal. [*q.* 37.]

f. Permanent stricture. The canal of the œsophagus may be permanently narrowed, as it has been already shown, by contraction of the cicatrix following the sloughing of the inner membrane. But by permanent stricture of the œsophagus is properly meant the narrowing of its channel from inflammatory thickening of the mucous and submucous coats, by which a sort of firm ring of variable depth is formed, encroaching upon and straitening the canal. The symptoms are, difficulty in swallowing, which progressively increases, and is liable to occasional paroxysmal exacerbations from spasm. In the early stage, the disease is curable by the use of bougies: if neglected, the stricture becomes narrower, the œsophagus ulcerates above the stricture, and finally opens into the cellular membrane, or the trachea [*q.* 42.], or the lungs; or abscesses form in the adjacent parts, and with increasing difficulty of swallowing and symptomatic fever, the patient sinks. The ordinary place of stricture of the œsophagus is where the latter joins the pharynx: sometimes stricture occurs lower down: sometimes there are more than one.

g. Ulceration. Ulceration of the œsophagus most frequently occurs at its upper part [*q.* 23.]; sometimes lower down, when it may open into the lungs. [*q.* 44.] The symptoms are not distinguishable from those of aggravated stricture. But the obstruction in ulceration proceeds entirely from spasm; in permanent stricture, partly only. In each, the food, even when liquid, will sometimes be arrested above the diseased part, and after a few seconds or minutes be returned into the mouth.

h. The œsophagus is liable to be contracted through partial hypertrophy of the cellular coat, producing a mass of dense white substance penetrating between the muscular fibres, which is commonly called scirrhus [*q*. 39.]: whether it be ever truly of that nature, I do not know. The symptoms are the same as in common stricture, and the occasional use of the bougie is beneficial.

Pressure upon the œsophagus from tumours external to it will interrupt deglutition; such as may be caused by enlargement of the thyreoïd gland, of the bronchial glands, or of the glands in the posterior mediastinal cavity; by aneurism of the aorta, or abscess upon the dorsal vertebræ; or even, according to Abercrombie, by abscess betwixt the coats of the œsophagus. Dr. Abercrombie mentions, that he has seen several examples of the latter affection in the upper part of the œsophagus [pharynx?] so situated, that they could be reached by the point of the finger, and opened by a curved instrument. They all did well; but fiom the quantity of matter discharged from one of them, the disease must have been of immense extent. The breathing was much affected in this case, and swallowing was almost impossible. A remarkable case occurred to Mr. George Bell, in which the dysphagia had existed so long that it was considered as an example of stricture of the œsophagus, and a probang was introduced. When this reached the part, which was very low down, it ruptured the abscess, and an immense discharge of matter took place with immediate and permanent relief.

It has been mentioned, that the pharynx is sometimes palsied in head disease: the œsophagus is then probably palsied likewise. The cases given by Dr. Monro of paralysis of the œsophagus appear to me to have been varieties of spasmodic stricture.

Inflammation of the œsophagus from irritant or corrosive poisons has been already adverted to. Two other forms of œsophagitis have been met with. 1. In hydrophobia a considerable patch of the mucous surface of the œsophagus, or of he pharynx, or of the stomach, is occasionally found of a bright red. 2. In inflammation of the throat from cold, the inflammatory action may extend down the whole of the tube of deglutition. Dr. Abercrombie describes the case of a gentleman, who, on his journey to consult him for complaints in the head, caught cold in crossing the Frith of Forth. He complained of his throat, and there was a glandular swelling on the right side of his neck. His voice was hoarse, with a peculiar husky sound. The fauces were of a bright red colour without much swelling, but were covered in some places with aphthous crusts. He was at this time not confined, and there was no fever; but after a few days he became feverish, the other symptoms continuing as before. He was now confined to bed, and actively treated; and after eight or nine days he was much better, so as to be able to be out of bed: but there was still some rawness of the throat, with small aphthous crusts, and a husky sound of the voice. After a few days there was a recurrence of fever, which soon assumed a typhoïd character, with considerable appearance of exhaustion. He had some dyspnœa, with considerable difficulty of swallowing. The attempts to swallow excited sometimes cough and sometimes vomiting, and by both he brought up considerable quantities of a soft membranous substance. He became more and more exhausted, without any remarkable change in the symptoms, and died at the end of about three weeks from the commencement of the disease. For twelve hours or more before his death, he swallowed pretty freely.

Inspection.—The whole of the pharynx was covered by a loose, soft, adventitious membrane, which also extended over the epiglottis: a portion of it was found lying in small irregular masses within the larynx at the upper part. A similar membrane was traced through the whole extent of the inner surface of the œsophagus quite to the cardia. Near the cardia it lay slightly attached, forming a soft continuous mass about a third of an inch in diameter, and with the œsophagus closely contracted around it. The other parts were healthy.

Dysphagia sometimes results from displacement of the os hyoïdes.

SECTION III.

The Stomach.

The disorders of the stomach may be arranged under the following heads: — hemorrhage; acute inflammation; indigestion, whether functional only, or from chronic inflammation, or from hypertrophy of one or other or of several of the gastric tissues or of the muciparous glands, or from simple ulceration; gelatinization ?; malignant disease, whether carcinoma, medullary sarcoma, or gelatiniform cancer.

The coats of the stomach and of the intestines are, first, the mucous: secondly, the submucous — these two membranes cohere firmly, and are generally spoken of as one tunic, then called the mucous or villous; their joint folds form the rugæ of the stomach; the muciparous glands are sacs of mucous tissue embedded in the submucous: thirdly, the cellular coat — a lax and plentiful tissue intervening between the submucous and muscular coats, and allowing the former to project in coarse rugæ during the contracted state of the latter; the cellular coat is continuous with the cellular membrane which intervenes and connects the fibres of the muscular coat, whereby disease readily spreads from the one to the other: fourthly, the peritoneal.

There is a habit of the stomach rather than a disease, which has been observed in a small number of individuals, of throwing off part of its contents almost regularly after a full meal. I have no doubt that a case given by Dr. Abercrombie, as derangement of the stomach from a tumour attached to it, was of this nature.

A lady, aged about seventy, had been afflicted with periodical vomiting, which occurred so regularly a few hours after meals, that during the whole of the period she had vomited a part of almost every meal. It was brought up *without* nausea, and the affection had never injured her general health. She fell off rather suddenly, and died after a short illness with diarrhœa and rapid failure of strength.

The only morbid appearance discovered was a tumour the size of a hazel nut or very small walnut, resembling an enlarged gland. It lay in contact with the outside of the stomach near the pylorus, and was slightly attached to its outer coat, but without any appearance of disease in the stomach itself. This habit of the stomach is a variety doubtless, grafted on the impulse to rumination, which, although extremely rare, exists in some persons.

A. *Hemorrhage.* The mucous surfaces are constantly pouring out one secretion or another. By the same channels, through which their customary secretions find vent, blood may transude. At all events, blood transudes from the surface when no cognizable alterations from healthy structure can be discovered. In cases in which death has followed immediately upon gastric hemorrhage, the membrane has again and again been found entire, and of its natural consistence and texture throughout; sometimes partially red, and pulpy, and vascular; sometimes universally so, the submucous capillary network of vessels being still gorged with blood; sometimes quite pale, the same system of vessels having been completely emptied by the last hemorrhage; and sometimes studded with minute dark points, which could be made by slight pressure to start from the surface, and looked like grains of black sand*.

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* See Dr. Watson's instructive Lumleian Lectures upon this subject. Medical Gazette, vol. x.—The skin, which has so strict an analogy to the mucous membranes, is capable of exuding blood. Cutaneous hemorrhage is generally partial: the face, the fore part of the chest, the region of the liver, the fingers, the toes, the palms of the hands, the soles of the feet, have occasionally been known to be the seat of this affection, which consists in the skin becoming covered with a dew of blood: if this is wiped away, no unnatural appearance of the skin is perceptible, but the blood presently exudes afresh. Sometimes the hemorrhage is accompanied by redness and slight pain. Rostan describes two cases of females, in whom from terror [in one there was concomitant suppression of the catamenia] the skin became altogether and almost suddenly black. In the same one, after death, Rostan ascertained the change of colour to have been in the rete mucosum, probably from ecchymosis. Cutaneous hemorrhage is most frequent in hysterical girls. It is commonly supplemental of some other habitual hemorrhage, of the catamenia especially, and then periodical.

Hemorrhages from the stomach, as from other mucou surfaces, present themselves under three different characters. One in its origin is salutary, and has a manifest tendency to relieve the system; a second partakes of some of the features of inflammatory disease; a third proceeds from relaxation and debility.

Gastric hemorrhage of the first kind offers two varieties: first, when it is vicarious of some other habitual hemorrhage; secondly, when it proceeds from accumulation of blood in the abdominal glands.

Among the patients of the celebrated Hoffman was a woman of Amsterdam, who for eight years remained subject to a bleeding from the nose, which came on regularly every month a few days before the menstrual period, and ceased upon the flowing of the catamenia: then the locus of this periodical hemorrhage was changed; and for six months more, instead of epistaxis, she suffered hæmoptysis, occurring under exactly similar circumstances: every month she had slight cough, and expectorated blood. At the time when she was under Hoffman's care, the hæmoptysis had ceased for six months; but it had been replaced by vomiting of blood, which returned every month a little while before the appearance of the menses, and ceased when the natural discharge became fully established. This woman was plethoric, lived fully, and led an indolent life.

Gastric hæmorrhage vicarious of the catamenia is generally not dangerous. Mr. North however has stated, that he has met with two instances, in which suppressed menstruation was followed by repeated and at length fatal vomiting of blood.

Hemorrhage of this class sometimes takes place at advanced periods of pregnancy; sometimes as supplemental to habitual hemorrhage from the rectum.

The following case, given by Latour, exemplifies hemorrhage in relief of glandular congestion. A person who had been living in a malarious district had laboured the greater part of two years under obstinate ague. This was followed by an immense enlargement of the spleen, which came to occupy almost the whole of the abdomen. One night this patient vomited an enormous quantity of blood; a good deal passed away by the bowels also. This recurred from time to time, till, in the course of a month, the spleen was so far reduced in bulk that it could no longer be felt in the abdomen, and the patient lived and enjoyed good health for twenty-five years afterwards. It must however be borne in mind, that the abdominal congestion in parallel cases may proceed from more than simple glandular turgescence. The accumulation of blood in the abdominal veins, which leads to this form of gastric hemorrhage, is more commonly a result of hepatic obstruction, sometimes of a remediable nature, but in other cases irremediable.

Sthenic gastric hemorrhage. One form of hemorrhage from mucous surfaces partakes of the inflammatory character. Purpura hæmorrhagica, which is often attended with gastric hemorrhage, occasionally displays this feature, and is benefited by abstraction of blood.

Asthenic gastric hemorrhage. In the greater number of instances the secretion of blood in purpura coexists with want of tone, vascular relaxation, and debility.

Gastric hemorrhage taking place to any considerable extent produces a sense of weight and pain at the stomach, and is followed by nausea and vomiting of blood. The blood thrown up is of a dark colour, and more or less coagulated. Sometimes the coagula have evidently been moulded in the stomach; and sometimes clots are thrown up, partially deprived of colouring matter, and resembling the fibrinous polypi so often met with in the cavities of the heart.

Blood changed in its physical and chemical qualities is occasionally thrown up from the stomach. The coffee-ground vomiting which attends the advanced stage of cancer of the stomach, and the black vomit of yellow fever, are blood more or less altered.

It is not always easy to determine that gastric hemorrhage has taken place. If small in quantity, the blood may pass off by stool, and no means present themselves of determining its source. There is a case related by Franck, in which death took place from hemorrhage of the stomach without hæmatemesis; when both the stomach and the intestines were found distended by an enormous coagulum of blood. On the other hand, when hæmatemesis takes place, we cannot infer with certainty that there has been gastric hemorrhage. The blood vomited may have first been carried into the stomach from the nostrils or fauces, or even from the lungs, having been unconsciously swallowed when it has reached the pharynx; or it may even have been intentionally taken into the stomach for some purpose of deception.

Blood is liable to be poured directly into the stomach from other causes than hemorrhage without alteration of structure.

a. Bleeding, by way of exhalation, is often one of the earliest declaratory symptoms of cancer of the stomach, occurring long prior to ulceration.

b. Corrosive or irritant poisons, taken into the stomach, produce hemorrhage.

c. Ulcers of the stomach occasionally, although very rarely, open a considerable coronary vessel, when serious and even fatal hemorrhage is likely to ensue.

d. Aneurism of the aorta, or of the cœliac artery, may burst into the stomach.

e. Medullary disease of the liver may open into the stomach, and discharge blood into its cavity.

B. Acute inflammation of the stomach rarely occurs as an idiopathic complaint. As the effect of corrosive and irritant poisons, it is frequently met with. The symptoms which attend gastritis are, local pain and tenderness, vomiting of the ingesta, of mucus, and of blood. The appearances which characterize it upon inspection are, redness of the mucous membrane, softening of its texture, extravasation of blood in minute or larger spots into the submucous tissue. These appearances may be accompanied by sloughing and ulceration of the stomach from the corrosive effect of the poison, by ulceration from the irritating effect, by blackening and charring from the action of mineral acids upon the blood, by induration of the rugæ from the combined chemical and inflammatory agencies of the poison. The following instances, quoted from Dr. Christison's valuable Treatise on Poisons, will serve to exemplify the principal appearances met with. In Dr. Roupell's beautiful illustrations of this subject, the reader may turn to figures which have the truth and colours of nature.

But before describing the effects of poisons on the stomach, let me take occasion to advert to the effects of coarser irritants on this organ. For this purpose I select two cases, one to show how wonderfully impassive the stomach often is to the contact and attrition of solids introduced into it [sharp or pointed solids do not indeed generally let the stomach escape so easily]; the second, to exemplify destructive lesion caused by an accident, the possibility of which is hardly conceivable.

A young German nobleman tried to kill himself in a fit of insanity by swallowing different indigestible substances, but without success. He never suffered any particular inconvenience, except a single attack of vomiting daily; though, in the course of seven months after he was detected, he passed the following articles by stool — one hundred and fifty pieces of sharp angular glass, some of them two inches long; one hundred and two brass pins; one hundred and fifty iron nails; three large hair-pins, and seven large chair-nails; a pair of shirt-sleeve buttons, a collar buckle, half of a shoe buckle, and three bridle buckles; half a dozen sixpenny pieces; three hooks, and a lump of lead; three large fragments of a currycomb, and fifteen bits of nameless iron articles, many of them two inches in length. — *Christison, from Schmucker über den selbstmord,* p. 168.

When boiling liquids are attempted to be swallowed, they seldom pass beyond the pharynx; and their injurious effects are exercised upon the aperture of the glottis, which closes spasmodically, and, swelling with rapidity, threatens instant suffocation.

A man, while gazing up at the burning of the Eddystone Lighthouse, received a shower of melted lead from the building, and expired after twelve hours of suffering. Seven ounces and a half of lead had entered the stomach, which was severely burnt and ulcerated. — *Phil. Trans.*, vol. lxix, p. 477.

Effects of Corrosive and Irritant Poisons.

a. Mineral acids. The stomach is often found to contain a quantity of yellowish-brown or black matter, and is sometimes lined with a thick paste, composed of disorganized tissue, blood, and mucus. The pylorus is contracted: the mucous membrane is not always corroded: but there is excessive injection, gorging, and blackness of the vessels, general blackness of the membrane, sometimes even without softening. More commonly however, along with the blackness, there is softening of the rugæ, or actual removal of the villous coat, occasionally [but this supposes some period to have elapsed before death] regularly granulated ulceration with puriform matter in it. The stomach is not always perforated: but if it is, the holes are circular, and the coats thin at the margin, coloured, disintegrated, and surrounded by vascularity and black extravasation. In some rare cases there is no mark of vital reaction, except in the neighbourhood of the aperture. A case of this kind is related by Mertzdorff. The margin of the hole was surrounded to the distance of half an inch with apparent charring of the coats, and this areola was surrounded by redness; but the rest of the stomach was of a greyish white. In the body of a child two years old, which died in twelve hours [the stomach having been protected or the injury limited by a full meal of porridge], on the posterior surface of the fundus of the stomach, towards the pylorus, there was a hole as big as a half crown, which was surrounded to the distance of an inch with a black mass formed of the disorganized coats and of incorporated charred blood. The inner coat of the duodenum often presents appearances closely resembling those of the stomach. *Christison.* The blackened colour results from the agency of the acid on the blood: where this cause does not interfere, nitric acid has a characteristic effect in giving a yellow tint to the animal textures on which it acts.

b. Corrosive sublimate. Dr. Christison observes, that the local effects of this poison are twofold — corrosion namely, and ulceration; and that the former is seldom witnessed in man, on account of the solubility of the salt, its easy decomposition, and the violent vomiting it occasions. In a young woman who died in the Middlesex Hospital, forty-eight hours after swallowing corrosive sublimate, there was an oblong slough at the inferior part of the stomach towards the fundus; and the surrounding mucous membrane for the left two-thirds of the organ was of a deep rose-red colour. [*q*. 50.] The pharynx and œsophagus were lined with a layer of lymph. [*q*. 30.] The epithelium of the tongue was black, and partially detached. [*q*. 1.] Immediately upon taking the poison, she had vomited; the fauces swelled directly, and profuse salivation supervened. Thirty hours after taking the poison, the disposition to vomit had ceased: she drank porter with eagerness, and retained it: towards the second night she became delirious. In a man who survived nine days, Dr. Christison narrates, that numerous large, black, gangrenous ulcers, like those observed in bad cases of dysentery, were scattered over the whole colon and rectum: the stomach was also ulcerated, but the small intestines were not.

c. The fixed alkalies. In a boy who died in twelve hours, Mr. Dewar found the inner membrane of the throat and gullet almost entirely disorganized and reduced to a pulp, with blood extravasated between it and the muscular coat. The inner coat of the stomach was red, in two round patches destroyed, and the patches covered with a clot of blood.

d. Acetic acid. In a case of poisoning, in which the examination of the contents of the stomach seemed to establish that this substance alone had been taken, MM. Orfila and Barruel describe, that the stomach presented internally several large, black, firm elevations, owing to the injection of coagulated blood into the submucous cellular tissue; and elsewhere it had a greyish-white tint, with here and there a reddish colour: but the mucous membrane was perfectly entire.

e. Oxalic acid. In a case given by Mr. Holt, the mucous coat of the throat and gullet looked as if it had been scalded, and that of the gullet could be easily scratched off. The stomach contained a pint of thick fluid: this is commonly dark, like coffee-grounds, as it contains a good deal of blood. The inner coat of the stomach was pulpy, in many parts black, in others red. The inner membrane of the intestines was similarly but less violently affected. In Mr. Frazer's patient, the whole villous coat of the stomach was either softened or removed, as well as the inner membrane of the gullet, so that the muscular coat was exposed; and this coat presented a dark gangrenous-like appearance, being much thickened, and highly injected. Although these signs of violent irritation are commonly present, it must at the same time be observed, that some cases have occurred, in which the stomach and intestines were quite healthy. In a girl who died about thirty minutes after swallowing an ounce of the acid, no morbid appearance whatsoever was to be seen in any part of the alimentary canal.—*Christison.*

f. Nitre. The appearances observed in man after poisoning by nitre are solely those of violent inflammation of the stomach and intestines. In Laflèze's case, which proved fatal in three hours, the stomach was distended, and the contents were deeply tinged with blood; its peritoneal coat of a dark red colour, mottled with black spots; its villous coat very much inflamed, and detached in several places. In Souville's patient, who lived sixty hours, the stomach was everywhere red, in many places chequered with black spots, and at the centre of one of these spots the stomach was perforated by a small aperture. The whole intestinal canal was also red.—*Christison.*

g. Arsenic. The effects of arsenic on the stomach are purely inflammatory, the poison being supposed to have no corrosion or chemical action. Every variety of inflammatory redness may be produced in the mucous membrane, modified by more or less extravasation of blood into it. The villous coat is sometimes softened; sometimes, on the other hand, it is strong and firm, and the rugæ thickened, raised, and corrugated, as if seared with a hot iron. Sometimes the villous, and also more rarely the other coats of the stomach are found actually destroyed, and removed in scattered spots and patches. This loss of substance is occasionally owing to the same action which causes softening and brittleness of the villous coat; the action, however, having been so intense as to cause gelatinization. That such is the nature of the process appears from the breach in the membrane being surrounded by gelatinized tissue, and not by an areola of inflammatory redness. In other cases the loss of substance is owing to a process of ordinary ulceration, as is proved by the little cavities having a notched irregular shape, and being surrounded both by a red areola and a margin of firm tissue. Various secretions have been found in the inner surface of the stomach: the mucous secretion increased in quantity—sometimes thin and glairy—sometimes abundant and solid, as an attached pellicle, or loose shreds floating among the contents. Sometimes the matter effused is true coagulable lymph: this is distinguishable from tough mucus by its reticulated appearance, and by the threads of the reticulation corresponding with inflamed lines in the stomach beneath. Another and very common appearance is the presence of a sanguinolent fluid, or even of actual blood in the cavity of the stomach. The signs of inflammation are seldom to be seen in the small intestines much lower down than the extremity of the duodenum; and they do not often affect the colon. But it is a curious fact, that the rectum is sometimes much inflamed, though the colon and more particularly the small intestines are not. Dr. Baillie notices two cases in which the lower end of the rectum was ulcerated.—*Christison.* [*q.* 62.]

C. The affections of the stomach which are practically of the greatest interest, from their frequency, the severity of their local and sympathetic demonstrations, and the moderate amount and often curable kind of organic lesion which produces them, are usually grouped under the title of *dyspepsia*, or *indigestion.* The local symptoms of dyspepsia are, pain and distension, heartburn and pyrosis, nausea and vomiting. In individual cases, one or other of these symptoms is generally more prominent than the rest. The sympathetic affections which attend dyspepsia are, disordered action of the heart, oppressed breathing and cough, headach, giddiness, confusion of thought, melancholy, fits of every character, neuralgia, alterations of the urine, rheumatic pains, swollen joints, and swellings of the bones: there is therefore hardly a single class of complaints, which may not exist sympathetically excited by, and dependent for its continuance upon, disorder of the stomach.

Inspections after death lead us to suppose that the symptoms of dyspepsia may result either from functional disorder of the stomach, or from chronic inflammation of the mucous membrane, or from hypertrophy of the mucous coat, or of the submucous, or of the follicular structure, or of the cellular coat, or from two or more of these affections combined, or from ulceration beginning in the mucous coat or mucous follicles. In practice, it is seldom possible to distinguish between these different causes of dyspeptic symptoms. The best mode of treating the subject which occurs to me is, first, to give cases of dyspepsia which have got well, describing their symptoms and management; secondly, to describe particular lesions which dissection has shown to be occasionally associated with, and to have caused, these symptoms.

A gentleman, aged sixty-three, from a boy has suffered fits of indigestion, which have lasted several weeks at a time, and which have come on and left him gradually. During the attacks, he has been free from pain as long as the stomach has been empty; and the immediate effect of a meal has been to produce comfortable bodily feelings. This state he can protract, by continuing to drink wine, or by taking hot tea; but as soon as the stomach is quiet, and digestion commences, intolerable pain and distension and flatulence supervene, which last during the whole process. On one occasion, in September last, having risen from table after partaking sparingly of boiled turbot and roast partridge, he felt a numbness and weakness of both his arms, and immediately after dropped in a state of insensibility: he recovered in a few minutes, and has had no return of such a seizure: he slept tolerably well, but the following morning was taken with sickness, and vomited a large quantity of mucus, with a few fragments of the undigested repast, after which he began to mend of this attack. Being a chemist, he is averse from taking medicine: but a few grains of magnesia, which he constantly uses, allay the pain a little; and a mustard plaister applied on one occasion to the pit of the stomach produced a temporary improvement during one of the attacks.

A gentleman accustomed to moderate but very comfortable living had been for many years what is called a martyr to stomach complaints, seldom a day passing in which he did not suffer greatly from pain in the stomach, with flatulence, acidity, and the usual train of dyspeptic symptoms; and in particular he could not taste a bit of vegetable, without suffering from it severely. He had gone on in this manner for years, when he was seized with complaints in his head, threatening apoplexy; which after being relieved by the usual means, showed such a constant tendency to recur, that it has been necessary ever since to restrict him to a diet almost entirely of vegetables, and in very moderate quantity. Under this regimen, so different from his former manner of living, he has continued free from any recurrence of the complaints in his head, and has never been known to complain of his stomach.—*Abercrombie.*

A lady, aged about thirty, laboured under the following symptoms in the summer of 1818. She was affected with violent pain in the stomach, which seized her immediately after dinner, continued with great violence during the whole evening, and gradually subsided about midnight: it sometimes occurred after breakfast, but more rarely. The complaint was of two years' standing, during which time a great variety of practice and every variety of diet had been tried, but with very slight and transient benefit. The paroxysms occurred with perfect regularity: she was considerably reduced in flesh and strength, and had a sallow unhealthy look; and her whole appearance gave strong grounds for suspecting organic disease. In the epigastric region no hardness could be discovered, but there was considerable tenderness on pressure at a particular spot. Various remedies were employed during the summer with little advantage: at last, however, she appeared to derive some benefit from lime water, and returned home in the autumn rather better. But the affection soon recurred, and she returned to Edinburgh as bad as ever. After another trial of various remedies, this severe and intractable affection subsided under the use of the following simple remedy. She took two grains of the sulphate of iron three times a day, combined with five grains of the aromatic powder, and one grain of aloes, which was found enough to regulate the bowels. Under the use of this remedy she was soon free from complaint, and has continued to enjoy good health. —*Abercrombie.*

A protracted case of vomiting is mentioned by Dr. Parry, in which the vomiting was in such a degree that every thing was rejected, even a teaspoonful of water. The case had gone on in this manner for several weeks, and the patient was reduced to the last degree of emaciation; when Dr. Parry ordered half a grain of aloes to be given every four hours, moistened only with a few drops of liquid. This was retained, and acted gently on the bowels; and in less than two days the complaint entirely subsided. The bowels had been freely moved during the previous treatment, and other remedies in great variety had been employed without any benefit.

A female had for a considerable time laboured under symptoms which were supposed to indicate scirrhus of the pylorus, and her case had been regarded as entirely hopeless. She suffered severe pain in the stomach when the smallest quantity of food was taken, with great tenderness upon pressure, and constant vomiting, which occurred regularly about the same period after eating at which it usually takes place in affections of the pylorus. A variety of treatment had been employed without benefit, when Dr. Barlow determined upon trusting entirely to regimen, by restricting her to a diet consisting wholly of fresh-made uncompressed curd, of which she was to take but a tablespoonful at a time, and to repeat it as often as she found it advisable. On this article she subsisted for several months, and recovered perfect health.

A young woman in the family of the English Consul-general at the Hague, in the spring of 1818, was subject to intractable vomiting, which had gradually supervened in three months. At first the vomiting took place occasionally only: after a

for more than eight months had presented all the symptoms of chronic gastritis — vomiting, sense of weight at the epigastrium after taking food, total loss of appetite: the tongue was natural. In this subject the mucous membrane of the stomach was of a bright red colour [rouge vermeille] for a great extent of its surface.

The mucous with the submucous membrane is sometimes swollen, soft, and lax, in chronic inflammation: sometimes attenuated to the thinness of the tissue which lines the antrum in conjunction with inflammatory vascularity.

c. When chronic inflammation has existed for some time, it is liable to produce *thickening and opacity of the mucous and submucous tissues.* Or thickening, or hypertrophy of the mucous or submucous tissues, or of both, are met with; which, it certainly is not unlikely, and which Andral conjectures, are consequences of chronic gastritis. The preparation [*q.* 72.] presents thickening of these tissues for nearly the whole extent of the stomach. The symptoms were those of cancer of the stomach.

In a case which occurred at La Charité, the local and general symptoms were so decided, that it was believed the patient laboured under cancer of the stomach. Among other symptoms, coffee-ground vomiting often occurred. On examining the body, the stomach presented at its middle a surface something larger than the palm of the hand, of milky whiteness, from manifest induration and thickening of the mucous membrane: the latter, for the same extent, was covered with a sort of opaque, white, membraniform layer, resembling the epidermis of the œsophagus when of unusual thickness.

d. Sometimes the *hypertrophy* or enlargement particularly attacks *the follicular structure*, giving a mammillated fulness to the interior surface of the stomach, the enlarged orifices of the glands identifying the seat of the affection. A woman mentioned by Andral vomited every day about four pints of white glairy mucus like the white of eggs; and she never vomited either food or drink. On dissection, no other morbid appearance could be discovered than a general thickened state of the mucous membrane of the stomach, which was of a brownish colour, and the follicles were remarkably developed. This case throws light upon the source of pyrosis.

e. The *cellular coat* of the stomach is liable to be *hypertrophied.* In this affection, the cellular membrane between the muscular fibres is commonly involved; while the muscular fibre itself is either atrophied, or undergoes apparent increase.

The hypertrophy of the muscular coat, observes Andral, to which several authors, and in particular M. Louis, have drawn attention, is seldom an isolated phenomenon; such at least is the result of my observations. It is especially associated with hypertrophy of the cellular membrane in both its aspects, and between its fasciculi. On a section, the interfascicular layers of membrane appear of a harder, more dense, and brilliant texture than natural: they extend from the peritoneal to the submucous coat, and form membranous intersections, between which the divided ends of the muscular fasciculi slightly project like glandular lobules.

In a patient who died with symptoms of cancer of the stomach in the Middlesex Hospital, the pyloric extremity of the stomach was externally enlarged, white, and firm: on a section, it presented exactly the appearance just described; but the hypertrophy involved, in addition, the submucous tissue. The mucous membrane was full, soft, and velvety. [*q.* 74.]

To complete this series of examples, the following dissection, quoted from Andral, exhibits the additional complication of the mucous membrane ulcerated on the hypertrophied tissues.

The internal surface of the stomach was white over its whole extent. At the pyloric extremity there was manifest induration of the submucous tissue, with hypertrophy of the muscular coat. These tissues, as they receded from the pylorus, regained their natural appearance; but towards the middle of the stomach the coats presented a second thickening, with an almost cartilaginous hardness. The induration occupied the different tissues exterior to the mucous.

For the whole extent of the thickening, which was about the size of a five-franc piece, the mucous membrane had disappeared. The result was a superficial ulceration, the edges and surface of which were white, so that it at first escaped observation: the surface exposed by the ulcer was cellular membrane remarkably thickened. The patient had been attacked three years before with fever, thirst, pain in the epigastrium, vomitings: these symptoms had gradually amended; but the digestion had always been bad from this time, and attended with occasional vomitings. His death was hastened by chronic peritonitis.

f. Ulcers. One or more chronic ulcers, often attended with extremely mild dyspeptic symptoms—the consequence probably of very partial chronic inflammation—are liable to form in the internal surface of the stomach: there is, however, generally but one such ulcer at a time, and that circular and of small extent; the edge not remarkably raised or hard. Sometimes the form of the ulcer is less regular; and it may be larger, and the edge thickened. The termination of this complaint is various: the ulcer may either cicatrize and heal; or may perforate the stomach, and allow its contents to escape into the peritoneal cavity; or adhesion having taken place before the perforation is completed, a neighbouring viscus may form a temporary wall for the stomach on that side; the ulceration may then eat its way through, and produce a fistulous opening either into another viscus, or through the parietes of the belly.

a. In a preparation in the King's College museum, the stomach is shaped into two cavities, with a narrow communication: this hourglass contraction of the stomach had evidently been produced by the cicatrization of an ulcerated surface or surfaces which had gradually extended round the stomach. [*q.* 80.]

b. A lady towards thirty years of age had been attended several years by Mr. North for frequent attacks of pain at the stomach, and flatulent distension. One evening, having suffered rather more than usual pain and distension of the stomach, she went early to bed. On her mother going into her room at nine the following morning to inquire after her, she raised herself in bed, and then dropt back and expired. I assisted in examining the body, and found in the stomach, as Mr. North anticipated, a circular perforation about half an inch in diameter, which looked externally as if punched; internally, the muscular and mucous coat were evidently eaten through by ulceration. The contents of the stomach had escaped into the peritoneal cavity: no adhesions or re-action had taken place. [q. 81.]

A young and healthy-looking servant girl, aged about twenty-one, while engaged at her work between seven and eight in the morning, was suddenly seized with excruciating pains in the abdomen, sickness, and vomiting. About ten she was bled to fainting, and twice afterwards in the course of the day. The bowels were freely moved by an enema, and she took purgative medicine, which did not operate: but there was no alleviation of the symptoms. The belly became tense, tender, and tympanitic; the pulse feeble and rapid: every thing she took was vomited; and she died in eighteen hours from the attack.

Inspection. The cavity of the abdomen was distended with air and the liquids that had been swallowed: the peritoneum was highly inflamed, and coated on the bowels with puriform matter. In the middle of the smaller curvature of the stomach there was a round opening about one-third of an inch in diameter. At the part where it was situated, the coats of the stomach were in some places nearly half an inch in thickness, and the thickening extended in a greater or less degree over a portion five or six inches in extent. The inner surface at the place of the rupture presented a deep excavation with rounded and smooth edges, like a deep corroding ulcer which had cicatrized. It was fully half an inch in diameter, and a third of an inch or more in depth. This patient had been residing in the same family the preceding four months, and was never known to complain of her stomach, or to have the smallest deviation from the most robust health. Six months before, she had had a fever.—*Abercrombie.*

D. *Gelatinization of the stomach.* The fundus of the stomach is often met with in a half dissolved state; or a hole of greater or less dimensions is found in it, the edges of which are a soft, irregular, and flocculent fringe. The mucous membrane surrounding the perforation is pulpy, generally white, sometimes blueish or blackish: very rarely vascular; and when it is so, the blood may be squeezed out of the loaded vessels. The organs in contact with the dissolved part of the stomach are often found softened. Sometimes it has capriciously happened, that the solution has been principally external, the peritoneum being extensively softened, and partly dissolved, so as to lay the muscular coat bare on its outer surface.

Partial solution of the stomach was observed by John Hunter, and considered by him to be the effect of the gastric juice acting after death. The uncertainty of its occurrence has been explained through the researches of Tiedemann and Gmelin, who have established that the gastric secretion is then only acid and a solvent, when the villous coat of the stomach is subjected to some stimulus. It is still an undecided question whether gelatinization of the stomach can take place during life. [*q*. 84.]

E. *Malignant disease.* The expected publication of Mr. Kiernan's researches relating to the structure and growth of carcinoma, medullary sarcoma, gelatiniform sarcoma, and melanoma, will throw new and important light upon the nature of these diseases. I shall therefore speak of them in the present treatise very briefly. In the stomach, the symptoms which these diseases produce are not distinguishable with certainty from those of chronic gastritis or simple ulceration.

Carcinoma [*q*. 89.] affecting the cardiac region, partly in the state of cancerous ulceration.

Medullary sarcoma. [*q*. 88.] Extensive growth of medullary sarcoma to the height of three-quarters of an inch from a large extent of the pyloric portion of the stomach, projecting inwards. [*q*. 90.] Medullary sarcoma rising from the pyloric surface of the stomach, projecting as a great tongue several inches in length through the pylorus into the duodenum.

Gelatiniform cancer. A beautiful specimen of this disease was recently purchased, with other specimens, of Mr. Langserved for the College of Surgeons. It has attacked a considerable extent of the stomach, which is full half an inch in thickness: the natural texture being no longer discernible, but in its place a semitransparent tissue of little semitransparent gumlike lobules, with membranous septa interposed.

There is considerable difference in general in the symptoms of disease of the stomach when situated near the cardia, and when situated near the pylorus. In the latter case, the symptoms are more insidious, and even to the end less severe. In the former there is more of the distressing vomiting of stomach disease, and that so immediately after taking food as to lead to the suspicion of stricture of the lower part of the œsophagus: spasmodic stricture of the œsophagus sometimes attends it.

Melanosis has not been met with in the stomach, œsophagus, or pharynx: but extravasated blood in the tissues of the stomach, blackened by the gastric acid, has produced appearances which have been mistaken for it.

SECTION IV.

The Small Intestines.

It is impossible in a treatise like the present,—in which at once so wide a range of disquisition is embraced, and the subjects treated of have such varied and intimate alliances,—on the one hand to proceed a step without a most carefully-considered and digested method and order,—and on the other, to contrive a method in which important natural affinities are not frequently severed, and the arrangement occasionally based upon relations which are slight and arbitrary. Nevertheless, I trust that the reader will absolve me of having sacrificed much to the wish to preserve the appearance of system in this treatise, and will rather give me credit for having preferred the substance to the shadow, and while violating the common rules of systematic arrangement, for having availed myself of the most important affinities in pathology, or at least for having described the diseases of parts in those sequences which render their study pregnant with most instruction. In the present section I find it convenient to exclude the subjects of suppression of secretion, peritoneal affections, and abdominal hernia, which naturally claim to be considered here: while I pass under separate review, — affections of the duodenum — affections originating in the muscular coat of the jejunum and ileum, conjointly with other causes of obstruction originating in their interior—inflammation of the bowels—affections of the villous coat.

A. *Affections of the duodenum.* The affections of the duodenum deserve to be considered alone, as they are repetitions of the phenomena which are observed in the stomach.

a. Duodenal hemorrhage may occur under the same circumstances as gastric hemorrhage: the blood may be poured out by the exhalant vessels, as in purpura hemorrhagica; or from an ulcerated artery, as it happened in a case recorded by Broussais of fatal hemorrhage from the hepatic artery, opened by a duodenal ulcer. The blood effused, if the patient lives, may be part vomited, but the greater part is generally discharged by stool, presenting different appearances as it has undergone mixture or other alteration in its descent along the intestines. The term *melæna* is given to the discharge of altered and pitchy blood voided by the bowel.

b. Inflammation of the lining membranes of the duodenum is an occasional effect of the corrosive and irritant poisons. See the preceding section.

c. One or more small ulcers are liable to originate in the mucous membrane of the duodenum, or in the follicular structure, and to run the same course as simple gastric ulcers. It is presumable that such ulcers may heal. On the other hand, the ulcer may perforate the coats of the intestine, and the contents of the latter escape into the peritoneal cavity. [*q.* 100.]

In a very singular case described by Dr. Streeten (Midland Medical and Surgical Reporter, Nov. 1829), a communication took place between the duodenum and an external opening on the side of the thorax, at the interval of the seventh and eighth ribs, and articles of food or drink were frequently discharged by it. The duodenum was found greatly contracted beyond the seat of this communication, which was produced by means of a canal two inches and a half in length passing from the opening in the duodenum through thickened cellular texture to the external aperture. The affection was complicated with extensive disease of the liver and of the thoracic viscera. The patient appears to have lived about a month after the communication took place between the duodenum and the external parts.

d. There is a duodenal indigestion, which as on the one hand it may be functional only, or may depend upon chronic inflammation, or upon simple ulcers, so may it be the result of every form of malignant growth: it is rare, however, to find the duodenum thus affected alone.

The leading peculiarity of disease of the duodenum, as far as we are at present acquainted with it, seems to be, that the food may be taken with relish, and the first stage of digestion be unimpeded; but that pain begins about the time when the food is passing out of the stomach, or from two to four hours after a meal. The pain then continues, often with great severity, sometimes for several hours, and generally extends obliquely backwards in the direction of the right kidney. In some cases it gradually subsides after several hours, and in others is relieved by vomiting. The peculiar characters of disease of the duodenum are well illustrated by a case related by Dr. Irvine in the Medical Journal of Philadelphia, for August 1824. The patient was liable to attacks of pain and vomiting, which at first occurred at long intervals, but gradually became more frequent, until they occurred regularly every day. His appetite was good, and the functions of his stomach were unimpaired for two, three, or four hours after a meal. He was then seized with violent pain followed by vomiting, and the pain did not cease till the stomach was completely emptied. He died, gradually exhausted, in about six months from the time when the attacks began to occur daily. About three weeks before his death, a tumour was felt in the right hypochondrium, which after eight or ten days subsided. On inspection, the stomach was found distended but healthy, and the liver was sound. The duodenum was enlarged and hardened, and internally showed an extensive surface of ragged ulceration. It was also studded with tubercles, varying in size from that of a hickory nut to a hazel nut. In the largest there was a soft white matter, and the cavity of the duodenum contained about four ounces of pus.—*Abercrombie.*

Vomiting is not so simple a consequence of duodenal as it is of gastric disease: it is here a symptom in some sort transitional between the effects of gastric and of intestinal disorder. Vomiting from duodenal disease either may be the result of *irritation*, like vomiting from affections of the stomach, or it may be the result of *obstruction*. The calibre of the duodenum is liable to be contracted by thickening of its coats to a degree which practically obliterates the cavity, when vomiting ensues as in strangulated hernia.

The duodenum closely adjoins the stomach, liver, and pancreas: it is situated before the spine, the psoas muscle, the right kidney, and ureter, and behind the ascending portion of the colon. There are few occasions for finer diagnosis than this complicated region affords. Disease can hardly exist in one of these parts without through contiguous sympathy implicating in a greater or less degree those adjacent to it. It is thus often extremely difficult in individual cases to identify the organ primarily attacked.

B. *a*. The muscular coat of the jejunum and ileum is the part principally affected in *ileus*. Great ambiguity exists as to the nature of this complaint; its characteristic features in their simplest form are given in the two following cases.

A patient after a short febrile illness, during which there were natural stools, was taken with pain in the belly, want of passage through the bowels, and vomiting, which became stercoraceous. Death ensued in two days. The jejunum and upper portion of the ileum were distended, and two or three feet of the latter dark coloured and vascular. The portion which succeeded was contracted and pale. The peritoneum was not inflamed. [*q*. 110.]

A woman, aged twenty, was affected with violent pain at the upper part of the abdomen, extending towards the left side, and at times increased by pressure; frequent and by the following question, on what does the prominent feature, *the obstruction*, depend? Does a spasmodic contraction of some portion of the ileum cause it; and is the intestine above this portion large and congested, and the source of pain, vomiting, depression, and death, only because its action cannot overcome the spasm of the part below? or is a congested and weakened state of the muscular coat of some part of the bowel the means of interrupting the mechanical function of the intestine? It is not contrary to analogy to suppose that the latter condition of the parts constitutes ileus: and if the effect, which will be afterwards adverted to, of the secretion of gas into the intestine,—calculated as it is to impede and resist the action of the muscular fibres, already weakened through congestion or a low degree of inflammation,—be taken into the account, one may thus form a very plausible solution of the phenomena of ileus, without having recourse to the hypothesis of spasm. My own impression, however, leans towards the first solution given. I am disposed to conjecture, that spasm and contraction of the muscular fibres of one portion of the intestine are the primary source of the disorder; the symptoms and the varied appearances of the dilated part of the intestine above being so much the same with those which are met with in different cases of fatal strangulated hernia.

The remedies, which are beneficial in ileus, appear to me to countenance the theory of the disease which I have adopted. The principal of these are blood-letting, the tobacco injection, and opium, which might well allay and remedy spasm of one part, and a consequent state of distension, congestion, and inflammation of the portion above it; but are hardly calculated to relieve any supposed state of distension of a part of the intestine merely dependent upon weakness of its muscular structure.

Dr. Abercrombie, from whose work on the Diseases of the Abdominal Viscera — rivalling, in scientific and practical interest his Treatise on the Brain — I have largely borrowed, is not disposed to admit the hypothesis of spasm: yet among his numerous illustrations of the subject there are many which seem to me to favour it.

b. There is an affection, the symptoms of which are identical with those of ileus, which may occasionally originate in the same condition of the intestine. This affection is the *intussusception*, or invagination with inversion, of the intestine. The common seat of the disorder is the small intestine. But the part, which invaginates, is often the caput coli; and sometimes the disease altogether originates in and is confined to the great intestine. [*q*. 120.]

A woman aged thirty-two [9th November, 1818], while sitting dressing her child, was suddenly seized with vomiting and pain at the stomach, which soon after moved downwards, and fixed with intense severity at the region of the head of the colon. The whole abdomen then became painful and tender. 10th. Urgent vomiting; violent pain over the whole abdomen, with frequent paroxysms of aggravation which produced screaming; abdomen tender; pulse 120, small and feeble; countenance exhausted. She lived in extreme distress, without any particular change in the symptoms, for three days more, and died on the 13th.

Inspection.—The small intestine was greatly distended. About three inches from the lower extremity of the ileum there began an inversion of the intestine to such an extent, that more than eighteen inches of the ileum had passed into the cavity of the caput coli. The inverted parts were inflamed and extensively gangrenous, some portions being reduced to the state of a soft pulp. The colon was healthy.—*Abercrombie.*

A young man, aged nineteen, awoke in the night of the 23d October, 1819, complaining of violent pain in the abdomen, with urgent vomiting. Pulse at first natural, but in the course of the day became frequent: pain little increased by pressure. All the usual remedies were employed without relief. 25th. Pulse 120, and feeble; urgent vomiting; belly not tumid, and little or no pain on pressure; no stool; features collapsed. He died in the night.

Inspection.—The small intestine was considerably distended, with inflamed portions and spots of gangrene. Near the lower end of the ileum there was an intussusception, in which the included portion, about eight inches in extent, was very soft and gangrenous. Below this there was, in the cavity of the ileum, a considerable quantity of coagulated blood.—*Abercrombie.*

The cause of intussusception has not yet been made out very satisfactorily. In the bodies of infants, in whom there has been no abdominal disease, partial invaginations of the bowel are often met with; and no doubt through the lively peristaltic action of their intestines frequently occur, and are again drawn out and righted. In a preparation of the small intestine of an adult, belonging to Mr. Cæsar Hawkins, an invagination of a few inches of the jejunum is preserved, which had been brought on by the irritation of a tænia lumbricoïdes, which adheres to the inverted part.

Who can say, in fatal intussusception, whether the first step is invagination, or whether it consists in inflammation and contraction of the part afterwards invaginated; or whether invagination and inflammation must accidentally coincide, in order to produce the disease?

One of the most remarkable circumstances in intussusception is the restoration which occasionally takes place when all hope is seemingly gone, and the patient has fallen into that prostration which attends sphacelus of the intestine, and is then the forerunner of death. It sometimes happens, that the patient, instead of dying, lives on; the obstruction, tension, pain, and vomiting, subside; the strength rallies gradually; and after a few days several inches of the bowel which were invaginated, are passed by stool: the part having sloughed, and become detached in the cavity of the living bowel by ulceration, while the edges from which the separation has taken place, have been glued together by peritoneal lymph, and grow together and permanently cohere by granulation.

c. I am tempted by the similarity of the symptoms to throw under the same head with the disorders enumerated, in which the muscular coat of the intestine is to so great an extent primarily or secondarily implicated, some cases of rare occurrence, in which the similar symptoms of obstruction result from some mechanical cause not external to the which sometimes continued for several days. In rals, she complained only of nausea and want of Purgatives were vomited, but the bowels were n by injections. She died, gradually exhausted, ee months from the commencement of the disease. tion.—There was great thickening and induration ats of the ileum at its termination in the colon; opening was so narrowed, that it only admitted the he little finger. The ileum was distended and dark —*Abercrombie.*

teritis. The acute disease, called inflammation of ls, is generally not distinguishable from that form in which inflammation is joined with the charac-ause of obstruction, whatever that cause may be. ation of the bowels is characterized by pain and ss of the belly, vomiting, and want of passage. vomiting may cease, or never be a prominent fea-d the passage through the bowels may be restored, have been interrupted, and yet the patient die of ation. The inflammation attacks all the tissues of el, but its principal seats are the muscular and l coats. The pulse may be frequent and small, or and full, or vary little from the natural standard; pain and tenderness of the belly, which are the stant symptoms, may be occasionally intermittent, in paroxysms, leaving long intervals of compara-e.

, aged ten (10th May, 1832), who was out at play orning before breakfast in perfect health, returned out nine, complaining of pain in his belly. Laxa-licine was given him, and was repeated at intervals out the day without effect. In the evening he o vomit, and passed a restless night with frequent g, the pain in his belly continuing. 11th. Pain con-n the early part of the day, but subsided in the n: he was seen by a surgeon, who ordered a succes-purgatives, but they were constantly vomited. I saw at night, and found the pulse 120, and of tolerable h. The pain had in a great measure subsided, but great tenderness of the whole belly continued, with frequent vomiting; and there had been no stool. Bleeding from the arm was employed with much apparent relief, followed by leeches, &c. The bowels were now moved by a mild enema, and he had afterwards one or two motions; but he continued very restless, and died about five in the morning, not more than forty hours from the first complaint of pain.

Inspection. — The upper part of the small intestines was much distended: on the lower part there was high inflammation, with extensive adhesions. By the distension of the upper portion, a great part of the ileum was pressed together into the cavity of the pelvis, forming a mass of disease, the different parts of which adhered extensively to each other, to the rectum, and to the sides of the pelvis; much force being required either to separate them from each other, or to raise them out of the pelvis. The inflammation extended over a great part of the small intestines, but the principal seat of it was the ileum; and the bladder also seemed to be affected. In the cavity of the pelvis there was a considerable quantity of puriform fluid.—*Abercrombie.*

D. *Inflammatory and ulcerative affections of the mucous coat.* The ordinary and common symptom of these affections, as it might be anticipated from physiology, is purging; that is to say, increased secretion, with increased action of the muscular fibres, which surround and are under the control of the mucous membrane. But many circumstances may occur, to prevent this symptom having any prominence; such as debility, a tranquil state of the great intestines, and probably violence of inflammation.

a. Acute inflammation of the mucous coat is extremely rare. The following case, which occurred in the practice of Dr. Alison, may exemplify some of its features, modified perhaps by the depression following fever.

A woman aged about thirty, in November 1827, was received into the clinical ward of the Royal Infirmary of Edinburgh, affected with symptoms of continued fever in a very mild form; and after five or six days she was considered as convalescent. She recovered strength so slowly, however, that she was allowed to remain in the hospital; and she went on for ten days without any symptom, except weakness. She then seemed to relapse, complaining chiefly of headach, and pain of the back. After this she had sickness and a good deal of vomiting, and complained of pain, with some tenderness, referred to the region of the liver, which was relieved by topical bleeding. She still had sickness, with occasional vomiting; the pulse continued frequent and weak; her strength sank rapidly; and she died in four days from the commencement of this relapse. There had been no diarrhœa; stools had been produced by enemata, and they were tolerably healthy.

Inspection.—In the lower end of the ileum, a portion of the mucous membrane, eighteen inches in extent, was covered by a thin uniform film, like the crust of aphthæ; beneath it, the membrane showed a high degree of redness. The peritoneum covering this portion of intestine showed some minute flakes of coagulable lymph for three or four inches. All the other parts were healthy.—*Abercrombie.*

A woman, aged twenty-five, was affected with pain over the abdomen, tenesmus, and diarrhœa. The pain intermitted occasionally, and was most severe on going to stool and on passing urine. The concretions were free from scybalæ or blood. She had headach, thirst, some cough, nausea, occasional vomiting, and a pale emaciated look: pulse 72. She ascribed her complaints to cold, and they had been gradually increasing for three weeks. Various remedies were employed without benefit, consisting chiefly of opiates, absorbents, and calomel. The disease went on for eight days more, during which time the state of the bowels was as follows.

2d day. Two stools, severe tormina, which were relieved by fomentation.

3d day. Nearly free from tormina; one stool, which seemed to consist of broth, which she had recently taken, little changed.

4th day. Two scanty evacuations, without griping; abdomen hard and painful; vomited once: a mild enema produced a copious discharge, and relieved the pain.

5th day. Less pain; vomited several times; one stool thin and fecal; pulse 78: took six grains of calomel.

6th day. Two stools, one of them thin and fecal, the other much tinged with blood; much pain before the evacuations; abdomen tense and painful; pulse 80; vomited a considerable quantity of slimy matter tinged with blood, and having some purulent matter mixed with it: took eight grains of calomel.

7th day. Two stools, thin, fecal, and of a natural appearance, but preceded by much pain; vomited repeatedly some greenish slimy matter mixed with bloody pus; less tension of the abdomen; pulse from 60 to 70: took some calomel, with opium.

8th day. No stool, and no vomiting. Died in the night.

Inspection. — The vessels in the stomach, duodenum, and jejunum, were unusually distended with blood. The ileum was livid, with some adhesions; its internal surface was quite black, and it contained dark-coloured slimy matter mixed with very fetid pus. The colon on the left side was found livid, with adhesion to the abdominal parietes and to the lower part of the omentum, which also was of a livid colour; and between these parts there was much fetid pus.

The appearances of the mucous surface showing effects of different degrees of inflammation are,—

1. Portions of the membrane red, with flakes or a continued coating of lymph upon it.

2. An extensive portion of the mucous membrane exhibiting a soft consistence of an uniform black colour — gangrene of the membrane — sometimes implicating the muscular fibres.

3. Inflammation in patches confined to the muciparous glands; which are either thickened and covered with tenacious mucus, or with lymph, or present a dark-grey surface of a soft pultaceous consistence; the slough separating leaves an ulcerated excavation. Sometimes the obstructed follicles, distended with mucus, present the appearance of vesicles.

4. Ulcers of various appearances, — either simple excavations as under the preceding head ; or from chronic disease, joining to a surface either preserving the character of ulceration, or covered with an ashen slough, edges raised, hard, and ragged : the ulcers differing in number and size ; the intermediate surface generally healthy, sometimes partially thickened into red fungous elevations. [*q.* 130, &c.]

Where ulcers exist, danger likewise exists of perforation of the intestine from the giving way of the peritoneum. There is likewise danger of hemorrhage, from the possibility of a large vessel being opened.

Where ulcers of the small intestines attend phthisis, the follicular thickening which precedes them is often scrofulous. On making sections of the not as yet ulcerated but swollen follicles, tubercular matter is found in them.

b. The subacute or protracted forms of inflammation of the mucous membrane of the small intestines which are concentrated in the follicular structure, and lead to thickening and ulceration of the muciparous glands, exhibit three varieties.

1st. Where the local inflammation is the primary disease.

2d. Where ulceration follows fever.

3d. When it is attendant on phthisis.

1. A girl aged three years, about three weeks before her death, was attacked with vomiting, frequent calls to stool, and pain in the abdomen. The evacuations were reported to have been frequent, slimy, and fetid. After eight or ten days, when she was first seen by the late Dr. Oudney, she had frequent, irregular, febrile paroxysms. She had vomiting and frequent stools, which were of a clay colour; and the abdomen was tender upon pressure. Her tongue was white, and there was urgent thirst, especially during the febrile paroxysms. In this state she continued until a few days before her death, when she became oppressed and partially comatose, with frequent screaming, and great unwillingness to be moved. The pulse varied from 130 to 150, and she had frequent stools, which were now of a dull green colour mixed with specks of yellow. The pupil was

these ulcers, the intestines, when held up to the light, were semitransparent: they were found wherever the dark fungous appearance existed, and this was over a considerable part of the small intestine, in irregular portions, some of them six or eight inches in length, the intervening membrane being healthy. The colon was externally healthy; internally, there were many small ulcers, which had a different character from those in the small intestine. They were more distinctly ulcerated at the bottom: few of them were larger than the diameter of a split pea; but each of them was surrounded by a firm ulcerated margin, without any discoloration of the surrounding parts. They were chiefly observed in the ascending colon, and on the arch. On the inner surface of the stomach, near the pylorus, and of the œsophagus through its whole extent, there were numerous very minute superficial ulcers, of an oval shape, and scarcely larger than the diameter of a pin's head. The lungs were tubercular, and in the left there were several small abscesses. The other viscera were healthy.

c. The mucous membrane of the small intestines is the principal seat of three disorders, of very different degrees of importance, in the first of which analogy, and in the last direct observation, shows nothing more than hyperæmia of the mucous tissues and follicular structure, and in a less degree of the outer coats of the bowel.

The *diarrhœa,* which commonly prevails in this country during the latter end of August and beginning of September, is seldom attended with symptomatic fever. It lasts from three to ten days. The stools are frequent and watery, with a slightly fecal character; or more solid and clayey, from the absence of bile. There is commonly little griping, but some obscure tenderness on pressing the belly. There can be no doubt but that this affection depends upon an unusually irritable state of the mucous lining of the small intestine. The same affection occurs sporadically at every period of the year; the evident cause frequently being exposure to wet and cold, or unwholesome food.

Ordinary cholera differs from the preceding complaint in being attended with bilious vomiting and purging, joined with cramps of the legs and abdominal muscles. The same state of the mucous membrane of the small intestine is probably present as in diarrhœa; but the irritation upon it is aggravated or excited by a profuse flow of bile into the duodenum, part of which makes its way into the stomach. This disease is rapid in its course: in a few hours it produces extreme prostration; and if the purging and vomiting are not stopped, the patient is in danger from this cause, not to mention the various inflammatory affections which so much irritation of the bowels may set up.

Asiatic cholera. The symptoms are, after diarrhœa, or sometimes no premonitory symptom having occurred, sudden vomiting of the contents of the stomach with little nausea, and sudden purging without pain; the vomiting and purging frequently recurring, the liquid discharged being like rice-water or water gruel. With this, spasms of the muscles of the extremities and belly. In a short time—from one to three or four hours—collapse supervenes; urine is not secreted; the pulse is extinguished; the eyes are sunk; the eyelids are surrounded by a dark circle; the voice is hardly audible; the tongue is cold; the skin cold and passively shrunk, with a dirty look, or livid and blueish, particularly on the extremities; cramps of the limbs constant; vomiting and purging cease; death.

In the bodies of those who have died of Asiatic cholera one invariable and characteristic appearance presents itself. On opening the cavity of the belly, the alimentary canal looks as if it were preternaturally healthy and fleshy, of a light pink colour mottled with grey: the secretion on the surface of the peritoneum is slightly viscid. On opening the small intestine, the mucous membrane is found to have the same pink tint as the outer surface, as if it had been the seat of an unusual flow of blood; but without the redness of inflammation, or the dark vascularity to which the term venous congestion is often applied. The mucous follicles are remarkably full, large, and prominent. These appearances are most striking in the small intestines, but they extend to the stomach and great intestines; and the whole length of the tube contains the gruel or ricewater-like liquid, which has been passed during life.

Upon the true nature of this tremendous malady, it is difficult to come to a satisfactory conclusion, The analogy of the lowering effects of common cholera would lead us to suppose, that the spasm and prostration which characterize Asiatic cholera result from the violent action and exhausting discharges of the stomach and bowels that attend the majority of cases of this disease. The appearances which alone are observed with uniformity after death favour this supposition; which is additionally supported by the remarkable fact, that in the greater number of cases in this country, the disease has been immediately preceded by simple diarrhœa. When the intestines have been under the irritation of that disorder for some hours, they have directly passed into the state of cholera. It may even be confidently asserted, that many who have died of cholera in this country, would not have had cholera at all, if the premonitory diarrhœa had been arrested.

The next characteristic circumstance to the spasm, prostration, and copious mucous discharges in Asiatic cholera, is the state of the blood, which is deficient of its due proportion of serum and saline ingredients. But this alteration is intelligible enough, on the supposition that the abstraction of the fluids vomited and purged would reduce the blood to the condition in which it is actually found. It is evident, likewise, that such a condition of the blood so produced might be expected neither adequately to stimulate the heart, nor — this deteriorated blood being thrown with feeble impulse along the circulation—to animate the nervous system to its functions. How much of the prostration of Asiatic cholera depends upon the quality of the blood, is shown by the marvellous effects of injecting hot water, containing a small proportion of sea salt and carbonate of soda, into the veins. After the temporary utility of this expedient had been made known, I had an opportunity of trying it upon a patient of Dr. Hawkins's, in the Middlesex Hospital, who was in a state of complete collapse. Upon two [illegible] type of [illegible], when

the patient for two or three hours before death has lain cold, blue, motionless, the limbs affected with cramp,—upon death taking place the limbs and the jaws have begun to move in slow convulsions, the skin has become sensibly warmer, and the blue tinge has gone off, changing to a mottled red;—as if the organization, which had been borne down during the struggle between life and the disease, could temporarily re-exert its forces, when the pressure which extinguished life had ceased.

But what is the external influence that excites cholera? or, as that question cannot be answered,—is cholera infectious, or simply epidemic? Judging from its progress, when it first invaded this country, I am disposed to consider the disease as simply epidemic. I witnessed the complaint as it occurred in Lambeth and St. Giles's, in the midst of a very poor and crowded population. The disease attacked here and there a few persons only. A typhus fever in the same neighbourhood would have seized ten in a house, where the cholera found but one victim; and would have invaded every house in a street, where the cholera appeared but in two or three. On the other hand, the fact that cholera arrived in England at two of our ports, appears to favour considerably the idea of its propagation by infection: but it still must be borne in mind, that these ports were on the eastern coast, the coast by which the disease, if *epidemic*, and not infectious, should analogically of its former route have arrived; and that, if arriving as an epidemic on the eastern coast of our island, the disease should again analogically have broken out in crowded populations by the water side.

It must however be admitted, that a number of individual cases have been recorded, in which the disease *seemed* to be conveyed by personal infection; and it certainly is *not disproved* that cholera may be communicated by the exhalations from cholera patients. Practically, therefore, the disease ought to be considered of this nature; and where it prevails, the usual precautions against infection — so that they do not interfere with the offices of humanity — should be resorted to. Admitting the conclusion, that the disease is really infectious, the following positions require to be additionally assumed.

1. Cholera has a less force of infection than any other known infectious disease.

2. More predisposition is required to take the infection of cholera, than to take other infectious diseases.

3. A peculiar constitution of the air and season, or an epidemic disposition, is more necessary for the spread of cholera than for that of other infectious complaints.

4. Local peculiarities and habits of diet are of unusual influence in promoting the invasion of cholera.

5. As a practical corollary from the preceding conclusions, more care is advisable during the prevalence of cholera to avoid predisposing causes, than to avoid infection.

How, finally, is malignant cholera to be treated? Every remedy that has been tried, has failed in most instances, and has been successful in some. The various remedies which have been used may be classed as the empirical, the rational, and the paradoxical.

1. The *empirical.* When an English practitioner is at a loss, his resource is calomel and opium, or bleeding. Calomel in greater or less doses alone, or combined with more or less opium, is the favourite treatment for cholera in this country. Bleeding in the stage of collapse is impossible: in general, before collapse supervenes, it is injurious: but when occurring in strong and plethoric persons, and attended with violent spasm, the complaint thus treated at the outset, is believed to have been mitigated.

2. The *rational.* Cordials, with stimulants and opiates. This practice, in the stage of collapse, has proved wholly inefficient. Opium in large doses has gained general condemnation: it has been thought to give an unfavourable character to the secondary fever, if the patient survives the stage of collapse, and with some rare exceptions has been of no service in *that* stage. The saline treatment, so well advocated by Dr. Stevens, has had very ambiguous success. The external application of heat has proved useless. The injection of hot salt and water into the veins in some instances has been followed by recovery, and is certainly not

the worst practice that can be tried in the most serious half of cholera cases.

3. The *paradoxical.* *Cold affusion.* It is certain that, in some instances, salutary reaction has been produced by this means.—*Exciting vomiting by salt and water.* This practice often arrests the vomiting belonging to the disease, and sometimes the other symptoms.—*Purging by Croton oil.* I am assured, by an Indian practitioner, that he has known this practice successful. Repeated small doses of *nitrate of silver*, or *sulphate of copper*.

SECTION V.

The Great Intestines.

The disorders which I have placed under this head, and in which the great intestines are either exclusively or to a great extent involved, will be treated of in the following order. First, Suppression of intestinal secretion; constipation; tympanites. Secondly, Diseases of the colon analogous to ileus, internal obstruction, and inflammatory affections of the mucous membrane of the small intestines. Thirdly, Diseases of the rectum.

I. *a. Suppression of intestinal secretion.* I attended during several weeks a tall, extenuated child, aged sixteen, who a year before had had scarlatina; which left her debilitated, and liable to an occasional spasmodic difficulty of swallowing. She was extremely thin and weak, and food went against her, so that she took very little daily: once in a week or ten days she passed a minute quantity of dark-green feces. Dr. Merriman afterwards saw this patient. She died, after being reduced to the utmost degree of emaciation. On the inspection of the body, as it was reported to me by Mr. William Hawes, no appearance of disease was found; but the intestines were remarkably *thin*. The following case exemplifies the connection of thinness of the bowels with the same *tendency*. "A lady, aged about thirty, had been in bad health for four or five months; and was wasted like a person in an advanced stage of phthisis. She had a small frequent pulse and bad appetite, but complained of nothing except some undefined uneasiness in the abdomen. The bowels were slow, requiring the *constant* use of medicine; the motions were consistent and formed, but always of the deep brown colour of dark mahogany or rose wood, and no treatment had any effect in correcting that colour. The abdomen was collapsed, and nothing could be discovered by examination. Some time afterwards, she began to have uneasiness in her chest, with slight cough; she then became liable to fits of coma, in which she lay with her eyes open, but unconscious of any thing; at length she had repeated paroxysms of convulsion, and she died in a state of the most extreme emaciation, after an illness of eight or nine months' duration.

"*Inspection.*—No disease could be discovered in the brain, and the lungs were quite healthy, except some very old adhesions of the pleura. The intestinal canal was throughout so thin, as to be transparent like goldbeater's leaf. On the mucous membrane there was in many places a tenacious mucus of a dark brown colour; but no disease could be discovered in the membrane itself, and no morbid appearance could be detected in any organ."—*Abercrombie.*

I was requested to see a young medical man, who I heard was in a fit. I found him lying on the floor, sensible, but exhausted with suffering: the flexor muscles of the limbs and the muscles of the abdomen were in strong spasmodic action. He had been in this state for several hours. Ammonia and hot brandy and water were given him, and he gradually rallied. This I learnt was not the first seizure of the kind which he had experienced. Attacks of a similar description, but of less severity, would come on several times in the year: they were preceded by obstinate costiveness. This patient, now twenty-eight years of age, up to the age of fifteen enjoyed excellent health. At that age his bowels fell into the state of costiveness which has continued since. He grew up of a slight and delicate frame, physically incapable of much bodily exertion, and indisposed to it by a languor and drowsiness which probably arose from the imperfect action of the bowels. The bowels now act once in five or six days only: what is then passed is [illegible] it is only extraordinarily deficient in quantity.

With this he has little appetite; and even that he is afraid of indulging, lest it should lead to one of the attacks which I have described. These attacks [illegible] recur, when the bowels have been confined for an unusually long period. The belly then becomes hard and a little swollen: there is sickness, but nothing is thrown up [illegible] what has been recently taken into the stomach: there is a sense of uneasiness and pain above the umbilicus. When at the close of such an attack the bowels are relieved, the motions which pass are still extremely scanty.

b. Constipation. Two of the preceding cases exemplify nearly total suppression of intestinal secretion. From this state there is every intermediate shade to regular and healthy action of the bowels. But there are two principal varieties: in one, the entire quantity of feces is insufficient: in the other, the quantity is considerable: but owing either to torpor of the intestine, or deficiency of fluid, or of stimulating quality in the feces, they are retained and accumulated.

Torpor and deficient secretion from spinal disease. I was consulted in the case of a young lady, one of whose symptoms was obstinate constipation of the bowels, requiring that she should take nightly from twenty to thirty grains of the compound extract of colocynth, to produce an action of the bowels the following day. She had been ill four years, and her sufferings had commenced with severe pain across the belly, and obstinate costiveness. After a fortnight's illness the constipation yielded; but one leg became feeble, and the knee of that side was frequently spasmodically bent. This complication of palsy and spasm soon after affected the opposite leg; afterwards one hand became feeble and contracted. These symptoms grew upon her; but she retained a remarkably fine complexion, and had the appearance, when making no exertion, of perfect health. The vertebral column was perfectly straight and even; but she often experienced pain at the lower part of the dorsal portion, and pressure there gave her uneasiness. This circumstance, coupled with the other symptoms, led me to recommend that issues should be made at the lower part of the back. The remedy was followed by great relief. The legs mulation of flatus in the portion of intestine in the sac is certainly one of the causes which prevent reduction by the taxis, and tend to establish strangulation.

There can be little doubt, that, in ordinary cases, flatus is a secretion. This appears to me sufficiently proved by the fact of its formation when the alimentary canal is perfectly healthy, on some neighbouring viscus being diseased. Inflammation of the neck of the bladder fills the rectum with flatus. Inflammation or congestion of the uterus swells up the whole abdomen with intestinal distension. The sympathetic influence of the womb in producing wind in the bowels, is one of the causes which render women so subject to this disorder.

In the Edinburgh Medical Essays, Dr. Monro has described the case of a young woman, whose abdomen became so enormously distended that it often seemed in danger of bursting. This affection continued three months, and then disappeared by a prodigious discharge of flatus both upwards and downwards.

Several years ago, a gentleman consulted Dr. Abercrombie respecting a tumour in the right side of the abdomen. It seemed as large as the head of a child; and, when examined while he was in the erect posture, felt quite hard and unyielding: but on laying him in the horizontal posture, and making pressure upon it, the whole swelling disappeared suddenly with a gurgling noise. It appeared to be the caput coli in a singular state of distension. The affection had existed for a considerable time; and though he was subject to flatulence and indigestion, his general health was little impaired.

A lady, aged twenty-three, had been long affected with pain in the right hypochondrium, and a very confined state of the bowels, for which a great variety of treatment was adopted with little benefit. In the autumn of 1822, the abdomen became greatly enlarged, tense, and painful. Some relief was obtained from topical bleeding, blistering, and purgatives; but after a severe pulmonary attack in winter, the pain and weight were aggravated, and extended into the left side in the direction of the arch of the colon, with the worst practice that can be tried in the most serious half of cholera cases.

3. The *paradoxical*. *Cold affusion*. It is certain, that, in some instances, salutary reaction has been produced by this means.—*Exciting vomiting by salt and water*. This practice often arrests the vomiting belonging to the disease, and sometimes the other symptoms.—*Purging by Croton oil*. I am assured, by an Indian practitioner, that he has known this practice successful. Repeated small doses of *nitrate of silver*, or *sulphate of copper*.

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"*Inspection.*—A most remarkable inversion of the intestine was discovered, which began at the middle of the arch of the colon; and the parts concerned in it, including the remainder of the colon and a corresponding portion of the ileum, measured thirty-eight inches. The part that had protruded at the anus was the inverted caput coli. The inverted portion of the colon was of a dark livid colour, very soft, and in some places thickened. The portion of the ileum included within this was tolerably healthy. Besides the mesentery connected with the inverted intestine, a portion of omentum was included."

b. Narrowing of the colon by hypertrophy or inflammatory thickening of the mucous and cellular coats is rare, but nevertheless of more frequent occurrence than similar disease in the small intestine. The following case exemplifies stricture of the colon. At the sigmoïd flexure, permanent stricture is more common. Malignant disease of the colon producing narrowing and *obstruction* is more frequent than simple stricture.

"A man, aged twenty.four, had an attack of cholera about a year before his death, and from that time was liable to uneasiness in his bowels, with costiveness. After some time, he had great enlargement of the abdomen, which however subsided after some weeks; and the only symptoms then were, progressive loss of strength and most obstinate costiveness. When I saw him, a few weeks before his death, he was much wasted, had a very small pulse, his belly was tense and a little tender, his bowels were obstinately costive, and the strongest medicine and injections often failed in producing the smallest evacuation. He had occasional vomiting, but it was not urgent: he died, gradually exhausted, without much suffering: his abdomen had been tense, but not remarkably distended.

"*Inspection.*—In the centre of the arch of the colon there was a remarkable stricture, which only admitted the point of a very small finger from the left side. On the right side, the opening was covered across its centre by a flap apparently composed of fibres from the mucous membrane, which were attached at the upper and lower parts of the opening, and left only a lateral passage on each side of it. The left side of the colon, from the stricture downwards, was completely collapsed into a cord not larger than a finger. From the stricture, the right side became immediately distended to upwards of twelve inches in circumference: it continued of this size to the caput cæcum, and the whole was completely impacted with firm consistent feces. A great part of the small intestine was also distended with consistent feces."

c. Inflammation of the mucous membrane of the great intestine, leading to enormous pulpy thickening of the mucous and cellular coats, to ulceration, and to sloughing, is either acute or chronic, and constitutes *dysentery.* This disease forms one of the scourges of Europeans in hot climates. Even in its *acute form* it generally begins insidiously: after a day of ordinary purging, mucus and blood are passed, with straining and tenesmus; there is extreme sensibility to pressure in the entire course of the great intestine, and in no other part of the abdomen, with symptomatic fever, and generally a frequent wiry pulse. The remedies which have been found most successful are calomel in large and repeated doses, bleeding, and the injection of iced water and of a weak solution of creosote into the bowel. The disease is strictly limited to the great intestine, of which it pervades the whole. The disease has a remarkable tendency to recur: it is probable, that when the symptoms of a first attack disappear, the membrane is often left permanently thickened, and affected with chronic inflammation and even ulceration.

"A gentleman, aged sixty, had been for some years liable to an irritable state of bowels, which affected him chiefly after exposure to cold, and was generally accompanied by mucous discharges tinged with blood. He was seized with one of these attacks, while he was at a distance from home, in September 1827, which seems to have been more protracted than usual; and on his return home, in the end of September, he was again seized in a still more violent degree. When Dr. Abercrombie saw him, about the third or fourth day of this attack, he had a look of much exhaustion and febrile anxiety: his tongue was parched, and his pulse frequent and rather small. He complained of much general uneasiness of the abdomen, especially across the epigastric region, where there was some degree of tension and considerable tenderness. He had frequent calls to stool, and the evacuations consisted of small quantities of mucus deeply tinged with blood, and sometimes almost entirely of blood. He had occasional hiccup, and some vomiting. All the usual remedies were employed without benefit; the symptoms continued unabated; the vomiting became more urgent; his strength sunk rapidly; and he died in four days more, being about the eighth from the commencement of the disease. The evacuations retained throughout the same character, without the least appearance of feculent matter even when laxative medicine was given.

"*Inspection.* — The whole tract of the colon appeared moderately and uniformly distended. Externally, it presented no morbid appearance, except some degree of that softened and slightly thickened state which has been compared to boiled tripe. Internally, it showed most extensive disease of the mucous membrane. This consisted of portions of the membrane, of various forms and degrees of extent, being of a fungous appearance and bright red colour, and sensibly elevated above the level of the more healthy portions that were interposed between them: this morbid appearance, in patches separated by healthy portions of the mucous membrane, extended through the whole course of the colon and rectum; and it preserved throughout nearly the same character, without any appearance that could be considered as ulceration or even abrasion of the membrane. The small intestine and all the other parts were entirely healthy; and there was no appearance of feculent matter in any part of the canal.

"A man, aged fifty (7th Oct. 1827), was seized with general uneasiness over the abdomen. On the 8th he took castor oil, from the operation of which he had numerous evacuations consisting almost entirely of blood. On the 9th he was seen by Mr. White, who found him complaining of great uneasiness in the bowels, chiefly referred to the lower part, but without much tenderness. He had frequent calls to stool, with scanty discharges which seemed to consist almost entirely of blood. His tongue was parched, but his pulse was little affected. 10th. The pulse was still nearly natural, but there was much pain and tenderness of the lower part of the abdomen, with some dysuria. The evacuations were now more abundant in quantity, and were remarkably changed in their character, being watery, dark coloured, and with a remarkable and peculiar fetor comparable to the washings of putrid flesh. For several days from this time there was little change. The evacuations continued watery, of a dark brownish colour and remarkable fetor, and without any appearance of feculent matter. They varied much in frequency, sometimes occurring every ten minutes, and sometimes leaving him quiet for several hours. There was much thirst, and the tongue was parched; but the pulse continued little affected till an advanced period of the disease. He had some hiccup, and vomited a few times, but it was not urgent. Dr. Abercrombie saw him for the first time on the 15th. He was then languid and exhausted, with an anxious typhoïd look, a small frequent pulse, and a parched tongue. He had much uneasiness, with some tension and tenderness of the abdomen, especially across the epigastric region: there were frequent painful calls to stool, with scanty discharges of dark watery matter, some vomiting, and considerable hiccup. He died early on the 16th.

" *Inspection.* — On laying open the abdomen, the whole tract of the great intestine, from the caput coli to the extremity of the rectum, was found to be greatly and uniformly distended. From the extremity of the rectum to nearly the middle of the arch of the colon, the intestine was of a uniform black colour, as if completely gangrenous. From the middle of the arch to the caput coli, the appearance was more healthy, but was variegated by numerous patches of a deep red or livid colour. These seemed to be deep seated, and were seen shining through the peritoneal coat, which appeared to be healthy. The large intestine being laid open, the mucous membrane at the black parts was throughout of a deep uniform black colour, very soft and easily separated; the muscular coat was black and easily torn; the peritoneal coat was healthy. These appearances were continued from the extremity of the rectum to nearly the centre of the arch of the colon: the mucous membrane then assumed an appearance more resembling that described in the former case, being elevated into irregular patches of a dark red colour, with interspersed portions in a more healthy state. Towards the lower part of the right side of the colon, there was an appearance of erosion or superficial ulceration; and on the inner surface of the caput coli there were several distinctly-defined ulcers. The ileum, for a few inches from its junction with the caput coli, was slightly distended, and its mucous membrane was reddened; the other parts of the canal were healthy. The inner surface of the urinary bladder, at its posterior part, showed a considerable degree of increased vascularity."

Chronic dysentery is well exemplified in the following case.

"A young lady, aged seventeen, had been liable, from an early period of life, to an irritable state of her bowels; but the affection had assumed a more fixed and alarming character about the beginning of the year 1827. She at that time became affected with more constant uneasiness in the abdomen, and a tendency to diarrhœa, with considerable irritation; and after some time, the motions began to exhibit a very unhealthy character. She became feeble and exhausted, with a quick pulse and hectic paroxysms; and a great variety of treatment was employed through the spring and summer without benefit. Dr. Abercrombie saw her in September. She was then much exhausted; had a feeble and rapid pulse, little appetite, and disturbed feverish nights, with considerable perspiration. She had much uneasiness extending over the whole abdomen, with some tenderness, and frequent calls to stool, accompanied by much pain and irritation. The motions sometimes consisted almost entirely of a tenacious puriform matter streaked with blood; at other times of thin feculent matter with much of this puriform discharge mixed in it, and occasionally there was healthy feculent matter of considerable consistency. After using some remedies without benefit, she began to take a strong decoction of cusparia combined with nitric acid, and small doses of laudanum; under the use of this, the puriform discharge entirely ceased; but she continued to have much uneasiness in the abdomen, with frequent stools, which were thin, feculent, and healthy. Her strength sunk gradually, and she died in October.

"*Inspection.*—The colon externally had a soft and slightly thickened appearance, and there were patches of a deep-seated redness shining through its peritoneal coat. On laying it open, its inner membrane presented one continued diseased surface through its whole extent. There were deep abrasions in some places, from which portions of the mucous membrane appeared to have been entirely removed: at others, more superficial irregular ulcerations of various extent; and in many places, round well-defined ulcers; and the whole was interspersed with portions of a dark reddish-brown colour in a state of fungous elevation. Through the whole extent of the colon and rectum, there was no spot that presented a healthy appearance; but the small intestine and all the other viscera were entirely healthy. In the sigmoïd flexure of the colon, there was a small portion where the intestine was considerably thickened in its coats, and of almost cartilaginous hardness."

The occurrence of inflammation of the mucous membrane in the small and great intestines at the same time has been already exemplified. But in general, the attack is confined to the one or to the other; and shows itself, if extending from either to their junction, by very inferior action, and that to a very small extent, upon the second part.

The point has been already several times adverted to, of rupture of the intestine taking place as a consequence of ulceration of the mucous surface. When perforation of the commencement of the colon takes place, it is not necessarily fatal: the ulcer may open into the cellular membrane in the fossa of the ileum, and give rise to an abscess that may point either in the loins or at the groin. A patient was in the Middlesex Hospital with an abscess which had broken above Poupart's ligament, and discharged feces: after a considerable period, the abscess closed. After ten years, it again opened: it continued to discharge for some months, when I lost sight of the case. It is not less possible for abscesses originating in the right iliac fossa to penetrate the colon, than for ulceration of the colon to work outwards into the iliac fossa.

A fistulous opening sometimes takes place from the arch of the colon through the parietes of the abdomen. An elderly woman was in St. George's Hospital with pain and tenderness of the belly below and to the left of the umbilicus. Leeches were applied to the part; when one of the leech-bites festered, and in a few days fecal matter was discharged through the ulcer: this continued till the patient's death, which happened in a few months. The fistulous opening [*q.* 80.] is seen to communicate with the great intestine, which had adhered to the front of the belly: the great intestine had likewise adhered to a portion of the small intestine, and between the two a second ulcerated communication had formed.

The great intestine when inflamed and ulcerated is liable to become extraordinarily dilated.

A naval officer, aged fifty-three, in the beginning of the year 1821, fell in walking down some steps, and struck his left side against the corner of one of them, about half-way betwixt the ribs and the spine of the ileum. No violent symptoms followed at the time, but he continued to feel some uneasiness at the part, which, though it varied very much in degree at different times, was never entirely gone. After some time, he began to have dyspeptic complaints, with loss of flesh, and his general health was considerably impaired. He then went to Cheltenham, where he got considerably better, but returned home, and, having lived rather freely, became worse again. After a considerable time had passed in this manner, a swelling was perceived in the left side of the abdomen, which was by some considered as an enlargement of the spleen, and by others as a disease of the liver. He now went through several courses of mercury, by which his strength was considerably reduced, but without any improvement in his complaints. His bowels had hitherto been in general pretty natural, but sometimes rather loose; and occasionally he had passed by stool considerable quantities of coagulated blood. These discharges had generally been preceded by a good deal of pain in the left side. The disease had gone on in this manner for about eighteen months, when he came to Edinburgh in the beginning of September 1823, and was seen by Dr. Abercrombie. He was then much emaciated, with a sallow complexion, a small frequent pulse, great weakness, and considerable anasarca of his legs. His belly was tumid, and there was considerable but not severe uneasiness in the left side, immediately above the crest of the ileum. At this place a firm, defined, deep-seated swelling was perceptible, which did not extend into the region of the spleen, and was evidently too low down to be considered as a disease of that organ; and, on repeated examination, it was distinctly perceived to vary sensibly in size on different days. It was, however, so firm as to convey the impression of a mass of organic disease. His bowels were moderately open; the stools were thin and very dark coloured, with an occasional mixture of blood. After he had been in Edinburgh for ten or twelve days, he was seized with vomiting, which had never occurred before his bowels became confined, with great pain in the left side, and much uneasiness extending over the whole abdomen. His strength now sunk rapidly, and he died in three days.

Inspection.—The swelling in the left side was found to be a disease of the descending colon, a portion of which was dilated so as to form a large irregular cyst, and the parietes of the cyst were thick and very hard, so as to be at some places almost cartilaginous. Externally the cyst adhered extensively to the parietes of the abdomen; internally, it presented a continued surface of dark-coloured fungous ulceration, with many elevations and depressions. The disease was entirely limited to the part forming the cyst, which was between four and five inches in diameter. The intestine, both immediately above and immediately below, was entirely healthy, and communicated freely with the diseased cavity. The spleen was quite healthy: the liver was tubercular, but not enlarged.

III. The diseases which affect the colon and rectum in common, — namely, suppression of secretion, constipation, inflammation of the mucous membrane and its sequelæ,—have been already adverted to. But there remain others, which either are peculiar to the termination of the intestinal canal, or from their greater frequency at that part deserve to be made a separate study. These diseases are, simple ulcer, or fissure of the rectum — indurated ulcer — carcinoma — gelatiniform cancer — medullary sarcoma — permanent stricture — spasmodic stricture — irritable sphincter — hemorrhage — piles — prolapsus ani — polypus — abscess and fistula — lacerated sphincter.

a. Simple ulcer or *fissure* of the rectum commonly forms immediately above the sphincter: its usual place is at the posterior surface of the gut; but I have known the complaint occupy the fore part. It is frequently produced by a mechanical cause, the mucous membrane being torn by hardened feces, and the crack becoming an ulcer. In the following case the disease had a different origin.

James Farrant, ætat. forty-five, was admitted into the Middlesex Hospital on the 9th of October. Fifteen months previously, he first experienced a sensation of heat and pain at the anus, which would last a few hours and then subside, leaving a feeling of numbness. While the pain lasted, the anus was strongly drawn inwards. The pain extended to the hips and to the sacrum. These symptoms recurred daily: they were always brought on when the bowels acted. About a month after the commencement of the complaint, something appeared to him to give way in the bowel, and a slight discharge of mucus took place, which continued afterwards. Other symptoms were present, which led me to suspect that the prostate gland was the seat of the disorder. The patient made water more frequently than before; and after the water had passed, some pain or uneasiness was commonly felt deep in the perineum, and of the same description with that which attended the evacuation of the bowels: mucus was likewise often discharged from the urethra after the urine had passed. Upon examining the rectum, the prostate gland was found to be larger than usual, and tender on pressure; to this organ the treatment first employed was directed. Leeches were applied to the perineum, and the hip bath was used. Blood was taken by cupping from the sacrum: an opiate suppository was used at night, an enema of tepid water in the morning. The bowels acted regularly, but the patient did not improve in other respects. Upon the rectum being re-examined, the seat of pain, at least of soreness, was discovered not to be towards the prostate, but at the posterior surface of the rectum within the sphincter. The bowel at this part was extremely loose and flaccid; but there could be distinguished upon it an oblong ulcer with a hardened edge. After trying several remedies ineffectually in this case, I divided the sphincter: the wound was made to heal by granulation and slowly, through the introduction of a few threads of lint between the edges.

The patient was sensible of immediate relief. The pain which he experienced for several days afterwards he felt to be the soreness of the wound, not the original pain of the ulcer. He was then ordered to introduce a mercurial ointment at night into the gut. When the part was examined a fortnight after the operation, the ulcer was found to have much improved, although it was still distinct; it had lost much of its sensibility together with its hardened edge. By continuing the use of the mercurial ointment, the patient entirely recovered. As the ulcer healed, the pain in making water, with the discharge of mucus from the urethra, and the swollen state of the prostate, equally subsided.

b. Spreading ulcer of the mucous membrane, with induration of the muscular coat, is a disease extremely prevalent among women in this country; and, unless taken early, it commonly proves incurable. The condition of the parts is the following: — the mucous membrane entirely disappears for th extent of from two or three, to thirteen inches from the rectum, and, if it extend as far, from the sigmoïd flexure of the colon; the muscular coat which is exposed does not granulate, but is to the touch hard and rough, and when cut through is dense and firm and almost gristly, but little if at all thickened; the muscular fibres are pale and atrophied, and the cellular texture indurated. The disease generally commences about half an inch within the anus: at the upper part it terminates very abruptly, the mucous membrane being eaten away at an uneven line extending round the gut. There is little or no thickening at either end of the ulcer. The ulcerated part of the intestine has a disposition to contract.

The symptoms of the disease are, pain and difficulty in passing the feces, which, when not liquid, consist of small fragments accompanied with blood and mucus, sense of weight in the part, and confinement and soreness aggravated by the action of the bowels, pain down the thighs, bearing down of the womb, irritable bladder, no ease but in the recumbent posture.

c. Carcinoma [*q.* 100.], gelatiniform cancer [*q.* 104.], medullary sarcoma [*q.* 101.], have the same anatomical characters in the rectum as in the stomach or sigmoïd flexure of the colon. Their mass and projection into the bowel enable the surgeon to distinguish them during life from indurated ulceration, but not from each other. The symptoms attending them are the same with those of the latter disease.

d. Permanent stricture of the rectum consists in a partial thickening of the submucous coat of the bowel and of the adjacent cellular texture; through which means a smooth ring is formed, generally from a third to half an inch in depth, which projects into and narrows the channel. Sometimes the thickening does not include the whole circle of the intestine, but a segment only. It is presumable that this thickening results from chronic inflammation.

The ordinary seat of stricture of the rectum is from two and a half to four inches from the orifice of the gut. But sometimes it occurs at a greater distance, at six to seven inches for example; and a contraction of the same nature is occasionally met with in different parts of the colon.

The symptoms, with the exception of purulent discharge, in place of which there is mucus, are the same in kind but less severe in degree than those ascribed to indurated ulcer. The nature of the disease can be ascertained by examination with the finger, when, as it usually happens, it is seated in the lower part of the rectum. When a similar disease occurs higher up in the gut, it is very difficult to distinguish it from malignant disease. The pain and difficulty which, if the instrument is rudely used, attends the passing a bougie into the sigmoïd flexure of the colon, is sometimes mistaken or misrepresented to be stricture. At this natural turn of the intestine, the bowel is occasionally torn through by instruments used by the unskilful, when death ensues.

c. Spasmodic stricture. What part of the rectum is the seat of spasmodic stricture? From my own experience, I am disposed to think that no single point is more liable to this affection than another. The cases, however, which I have met with, and have considered of this nature, have been any thing but satisfactory. They have left me with the impression that the upper part of the rectum, and the sigmoïd flexure of the colon, are liable to irregular contractions of their muscular tunic, capable of obstructing the passage of the feces and of making resistance to the introduction of instruments. This irregular action is generally dependent upon a vitiated state of the secretions; and is more frequently relieved by a regulated diet and alterative medicines, and the use of injections, than by the employment of instruments. Nevertheless, the use of the bougie is sometimes beneficial in spasmodic contraction of the rectum.

One of the best instances which I can give of this disorder is the following: it contains a very useful lesson as to its treatment. The patient is a physician, who is now through his judicious self-management at length restored to perfect health. The extract which I shall quote from a letter, in which at my request he favoured me with an outline of his case, that had several times been the subject of communication with me before, will convey to the reader an idea of the suffering which may attend this kind of disorder.

"In my life," says the writer of this communication, "I never knew what it was to have a single action of the bowels without the aid of medicine, or to be free for many hours together from all the wretchedness of disorder and of remedies in conjunction, excepting for two short intervals of time, during one of which I trusted simply to the use of injections of warm water, and during the other when I took the white mustard seed, and that with so singular an effect that for a while I thought I had quite got rid of my complaint. With the exception of these two intervals, I have never been able till lately to say there is in life that which is worth living for, or in other and more proper words, I did not know what it was to wish to live. To say nothing of the medical discipline which I have undergone again and again, I have been examined and treated for stricture of the rectum and of the sigmoid flexure of the colon for years, and for years never passed any thing from my bowels larger than a horse-bean, if solid, or of the little finger, if of a softer consistence. Oftentimes have I been quite incapacitated for exertion, and never able to enter upon my professional duties with any thing like alacrity or cheerfulness. It is now nearly two years ago since I came to the resolution of abandoning all remedial measures; to leave off at once physic, injections, and the bougie; to take nothing in the shape of food that could by possibility irritate the stomach or bowels, and to leave them to act of and for themselves, when they could no longer retain their contents. I had, as you may suppose, difficulties in bringing about so entire a change. At first I suffered much inconvenience from a sense of fulness in the bowels and in the head. But this I contrived to obviate by the very occasional use of an injection of warm water, determining with myself to overcome the disposition to contraction by making the contents of the lower bowels the means of dilating them. By a steady perseverance in this course of discipline, I have perfectly recovered; know nothing now of that distress of feeling, which for at least twenty years made life burthensome to me; I have seldom or ever occasion to have recourse to medicine, and then only as a man in perfect health would do. I should tell you, that at one time such was the state large pea, of a red colour, and supported upon a long narrow pedicle which had not much appearance of vascularity, was seen. The child appeared to be perfectly in good health, and no objection presented itself to tying the hemorrhoid at once. Accordingly I applied a ligature to the slender pedicle of the hemorrhoid; but being drawn too tightly, the thread cut through the part, and the pile came away at once. No disposition to bleed showed itself at the time; but the following night the child lost a profuse quantity of blood, and came to the hospital the following day faint and pale and reduced from the bleeding. The hemorrhage did not recur.

2. William Bond, ætat. thirty, was admitted into the Middlesex Hospital in December, 1828. He stated, that as long as he could recollect, a protrusion had taken place from the rectum whenever the bowels acted, and that expulsion of the feces was always preceded by a discharge of mucus. Until four months before his admission, the complaint had been unattended with pain. During the latter period he had continually experienced a sense of numbness and aching within the rectum, with variations only in its severity. When the bowels acted, a substance invariably came down, which consisted of a pedicle about an inch and a half in length, attached to the fore-part of the rectum, and terminating in an irregular hemispherical mass, the under and detached surface of which was not flat but nodular. Its texture looked not unlike that of a common polypus of the nose, but it had greater firmness. The disc of the tumour was more vascular than the pedicle, and it bled readily upon being handled. It was quite insensible. Upon examining the rectum, the pedicle of the tumour was found attached to the fore-part of the bowel, behind the prostate gland. There was some little hardness of the rectum at this part. I removed the protruding tumour by the ligature, which gave little pain, but caused some irritation of the bladder. In a fortnight the patient left the hospital, having got rid of the tumour, but with some hardness remaining where it had been attached. He came back again after three months, complaining of a sense of obstruction

and uneasiness in the rectum. I now found the fore-part of the rectum occupied by nodular masses, which to the touch appeared of the same substance with the original tumour. They were increasing rapidly. By drawing them out with the tenaculum, and making an incision at their bases, I contrived to include the whole in three ligatures. They came away, but the malignant growth returned. The tumour now grew rapidly, and the patient gradually sank. At three inches from the orifice of the gut, the bowel was perfectly sound.

k. Prolapsus ani. The protrusion of two to five or six inches of inverted rectum through the sphincter, produced by straining, from pain or costiveness, or by weakness of the sphincter; often attending piles, and cured by their removal; sometimes inveterate and irremediable.

l. Abscess and fistula. By a fistula is meant a narrow channel or sinus, secreting purulent or serous discharge, and having an external opening near the anus, through which the matter has vent. The opening of a fistula is often extremely small, so that there is difficulty in finding it. The channel itself, or fistula, is usually a little larger than a common probe: it is sometimes straight, sometimes crooked: its length may vary from half an inch to several inches. Towards its inner extremity a fistula reaches the coats of the rectum: it may terminate inwards by a small aperture of communication with the intestine, or blindly as a cul de sac. There may be one fistula, or there may be several; and in the latter case the fistulæ may or may not communicate. A fistula is a consequence of an abscess, which, when it has broken or been punctured, contracts to such a narrow channel as has been described, which continues permanent.

Abscesses near the rectum either are superficial and small, which is the character of those that lead to fistula; or they are deep-seated, when they often contain large accumulations of matter, but rarely produce the secondary complaint. The latter kind, if not opened, spreads within the pelvis, isolating and enclosing the rectum in a vast bag of matter, producing low fever and delirium.

m. Lacerated sphincter. The perineum is liable to be torn in labour, either superficially or through the sphincter into the vagina. In the former case, the laceration heals spontaneously: in the latter, in general it will not heal, unless the following practice is employed. The sphincter must be cut through on each side, and the wounds prevented healing by the introduction of a few threads of lint. The patient's knees in the mean time should be fastened together with a roller, and the laceration be kept repeatedly cleansed, when it will granulate and draw together: the lateral sections may *then* be allowed to close.

SECTION VI.

The Peritoneum.

The leading pathological relations of this important membrane are the following:—its influence in repairing lesions: its liability to acute inflammation, to chronic inflammation, to malignant disease, to be the locus of effusion from obstruction of the abdominal circulation.

A. It is the common tendency of all the serous membranes, upon slight irritation, to throw out lymph; by which, in a very brief period, the parts of their surfaces, which are in contact, become glued together. Mr. Travers has shown how effectual this process is in repairing wounds of the bowels. As soon as an opening is made in an intestine, either by a stab in the belly or through a blow, the wound of the intestine gapes, the divided muscular fibres retracting. If it happens that the wounded portion is empty, the peritoneal surface lying next against the opening into the bowel becomes then glued by lymph to the peritoneal surface surrounding the wound, which under favourable circumstances is thus permanently secured. The great extent of this power of restoration Mr. Travers exemplified, by tying a ligature round the small intestine of a dog: the ends of the ligature were cut off, the bowel was replaced, and the wound closed. The coils of intestine adjacent to the tied part then adhered to it, enclosing the ligature, which separated with the circle of dead matter enclosed within it into the cavity of the divided intestine, the extremities of which finally united by granulation, being in the interval securely held together by the original adhesion. This process, however, is to be relied on as little as possible in human surgery. Thus a single wound of an intestine had better be temporarily maintained as an artificial anus. But if there are several, nothing remains but to sew them with a fine continued suture, cutting the end close to, and returning the wounded portions into the belly.

B. *Acute peritonitis.* This inflammatory disease is often ushered in by bold and well-marked general and local symptoms. Often, however, its progress is insidious; the pulse being little affected, and the pain occurring in paroxysms, as the portion of intestine invaded by it is now distended and in motion, now at rest, and for a similar reason occasionally shifting its place; the stomach not irritable, the passage of the bowels free. The following cases will exemplify some of its most important features.

A girl aged fifteen, on Sunday 2d March, 1817, was at church in her usual health. In the evening she complained of some pain of the abdomen. 3d. Had pain of the belly and some vomiting; took castor oil, which operated copiously. 4th. Pain continued, with some vomiting, but not urgent, and the complaint excited no alarm; bowels quite open: was seen by a surgeon, who found her pulse 116 and very small, and the belly painful on pressure. 5th. Belly tense and tympanitic, other symptoms as before; was bled without relief, sunk rapidly, and died at night.

Inspection.—The whole tract of the small intestines presented one smooth uniform surface, being firmly glued together, and the interstices filled up by an immense deposition of coagulable lymph, which was quite soft and recent; and the mass likewise adhered to the parietes of the abdomen. There was a similar deposition, though in smaller quantity, on the surface of the great intestine; and it was traced nearly to the extremity of the rectum: it also appeared on the surface of the liver. The omentum was inflamed, and dark coloured; and there were considerable marks of inflammation on the peritoneum lining the parietes of the abdomen.

A young lady, aged twenty, was seized (July 9, 1822) with symptoms of peritonitis, which were relieved by blood-letting, and the other usual means; and on the 12th she appeared to be convalescent. At night she took some pills of aloes and colocynth, which operated frequently with much irritation. After this, the pain of the bowels returned, and continued through the 13th. 14th. There was some pain of the bowels, with tenderness, and the pulse was again becoming frequent: she was now bled from the arm, and a second time a few hours after; and, after the second bleeding, she became faint and low. Dr. Abercrombie now saw her for the first time, and found the pulse extremely frequent and small: she had a look of extreme exhaustion; but there was still much pain of the belly, with great tenderness: there was no vomiting. She was now treated by weak tobacco injections, cold applications to the abdomen, followed by blistering; and small doses of aloes, with extract of hyoscyamus, repeated every two or three hours. Under this plan she gradually improved: the pain and tenderness subsided; the pulse came down; the bowels were moved freely and without irritation; and after three or four days, she appeared to be convalescent. About the 20th she complained of some pain in the region of the liver, which was quite removed by topical bleeding; and from this time she appeared to be recovering perfect health: the pulse and functions of the stomach were natural, the bowels easy or easily regulated by the mildest medicine, and her strength improved daily.

About the 25th, she began to be troubled with a parotid swelling, which gave her a good deal of uneasiness; but in other respects she was well. She was in the drawing-room the greater part of every day, and every function was natural. The swelling advanced slowly to suppuration, and was of very considerable size: it discharged a little matter by the ear, but she would not submit to have it opened. On the night of the 2d of August she went to bed in her usual health, having been in the drawing-room during the day, and without any complaint except the parotid swelling. Early in the morning of the 3d she awoke in great distress, with cough and oppressed breathing. When Dr. Abercrombie saw her, about eleven o'clock, her face was cadaverous; her breathing frightfully oppressed, with a rattling sound: the pulse was very frequent, and there was in the room an intolerable fetor. The first impression was, that the parotid swelling had burst into the larynx; but upon opening it, healthy pus was discharged; while small quantities of frothy fluid, which she coughed up, were intolerably fetid. She died about twelve.

Inspection.—Betwixt the diaphragm and the upper surface of the liver there was formed a distinctly-defined cavity, lined by a cyst of coagulable lymph, and containing at least a pound of thin puriform matter of intolerable fetor. The right lung adhered extensively to the diaphragm; and the diaphragm was perforated by a small opening, by which the matter from the abscess had passed freely into the bronchial canals, and it was traced as far as the trunk of the trachea. The liver was sound in its internal structure, but in its peritoneal coat there were some marks of inflammation. The intestines adhered to each other, through almost their whole extent, to the omentum, and to the parietes of the abdomen; so that no portion of intestine could be traced without tearing these adhesions, which were soft. Throughout this mass of disease, there were in several places cavities of various sizes containing purulent matter: one of these, on the right side, seemed to communicate by a small canal with the great abscess above the liver. On the posterior part of the pelvis, behind the uterus, another great abscess was discovered, containing nearly a pound of thin fetid pus. It was circumscribed by adhesions betwixt the intestine, the uterus, and the ovaria, so that it was completely cut off from the other parts, and remained entire, after the examination of them had been concluded.

The following case is too important to be passed over, when I am borrowing so freely from Dr. Abercrombie's treatise.

"A lady, aged about thirty-six, a few days after her accouchement, was seized with symptoms of peritonitis, which was treated in the usual manner by a judicious practitioner. The activity of the symptoms was subdued by two bleedings: the bowels yielded to laxative medicine, which, in fact, operated rather fully and with irritation. This was followed by a state of exhaustion, in consequence of which I saw her. I found her with a haggard and exhausted look; the skin clammy; the pulse feeble and rapid; the whole abdomen tympanitic, and enlarged to the size of the last period of pregnancy. Wine was now given her at short intervals, with injections of beef-tea containing assafœtida and sulphate of quinine. Under this treatment she improved rapidly, and in a few days was in her usual health."

There is a form of acute peritonitis connected with erysipelas, in which the effusion has less of lymph, but is either sanious or purulent. The proportion of pus in common inflammatory effusion is very variable.

C. *Chronic peritonitis.* The obscure and insidious nature of this disease is well shown in the following case.

A young lady, aged sixteen (April 5, 1816), for several weeks had been observed to lose flesh and strength, with listlessness and impaired appetite, but without making any complaint. She was now a good deal debilitated, and easily fatigued; had a hectic look; pulse 120; tongue rather foul appetite bad; abdomen tumid and somewhat tympanitic made no complaint of any pain; she only said that she felt 'stuffed in the belly.' She had not menstruated.

Such was the first report, Dr. Abercrombie remarks of one of the most insidious cases of this affection that has ever occurred to me. The patient was put upon the use of gentle laxatives, with tonics, and the tepid bath. The bowels were found in a very loaded state, and for about a fortnight she continued without any change: she was restless and hot in the night, and languid through the day, with bad appetite and quick pulse, but made no complaint of any uneasiness. In the middle of April she seemed to improve considerably: her appetite was much better, and she slept well in the night. She also improved in looks, in spirits, and in strength; but the pulse continued frequent, being generally from 100 to 120, and the abdomen retained a considerable degree of tympanitic fulness. The bowels were open, sometimes rather loose, with occasional griping pain, but no fixed uneasiness, and the motions were quite natural. In May she began to decline again, without any particular change in the symptoms, except progressive loss of flesh and strength. There was still no complaint of pain, except at times a little griping; and the bowels were natural. In the end of May she began to have some vomiting, and occasional diarrhœa; the vomiting became more and more frequent, until at last she could retain nothing. She died early in June, having been confined to bed only two or three days before her death.

Inspection.—The whole contents of the abdomen presented one solid mass of adhesion, in which it was impossible to distinguish one intestine from another. The mass likewise adhered extensively to the parietes of the abdomen; and in various parts of it there were cavities containing purulent matter, and presenting on their internal surface unhealthy scrofulous ulceration. There was also much purulent matter in the cavity of the pelvis. There was much disease of the mesenteric glands, and the liver was considerably enlarged. The lungs were sound. — *Abercrombie.*

Dr. Barron has described a form of this affection under the title of tubercular accretion of the peritoneum. The symptoms of the disease present no essential difference to those of ordinary chronic peritonitis. Upon dissection, the bowels are found glued together by lymph, which is studded with *lymph tubercles,* in some of which scrofulous matter is deposited. [*q*. 150.]

In chronic peritonitis, when matter is formed in the abdomen, it sometimes makes its way along the spermatic passage, and points externally: the patient may live a considerable period, with a discharge of pus from the peritoneum. It is to be recollected, that extensive abscesses sometimes form between the anterior parietes of the abdomen and the peritoneum, from which, when opened, matter, often mixed with air, is thrown out; with an impulse upon coughing, as when it proceeds from the peritoneal sac.

One kind of chronic peritonitis gives origin, not to adhesions, but to gradual and unequal thickening of the membrane, which acquires in parts a depth of a third of an inch. [*q*. 152.] This change is ordinarily confined to the reflected peritoneum; and the functions of the bowels are in this case materially less likely to be disturbed, than when the inflammation leads to general adhesion, which has a direct tendency to obstruct the passage of their contents.

Partial peritoneal adhesions occasionally lead to serious and fatal results. They are liable to produce obstructions of the bowels in several ways. A band of lymph may form a noose, into which a coil of intestine may slip; or the omentum, or the appendix cæci may be so fixed, as to form a ring; or two portions of intestine may be glued together at one point, while a third may accidentally wedge itself between them close on the adhesion; or one continuous portion becoming inflamed while lying abruptly bent, may be fixed by adhesion in such a position, that when distended it may obstruct its own channel. But for inward mechanical causes of obstruction, such adhesions are not necessary: the bowel will sometimes knot with itself. To exemplify this unlikely accident, I shall finally add another case from Dr. Abercrombie, which will form at the same time a natural transition to the subject which will next be presented to the reader.

A man, aged sixty (23d April, 1815), had been ill for a week, with the usual symptoms of ileus, which had resisted all the ordinary remedies. He was now much exhausted; and his belly was enlarged and tympanitic, with frequent vomiting. He lived in great distress till the 28th, and the swelling of the abdomen progressively increased until it resembled the abdomen of a woman at the most advanced period of pregnancy; yet to the last he could bear pressure upon every part of it: his pulse varied from 108 to 116.

Inspection. — On opening the abdomen, a viscus came into view, which at first appeared to be the stomach enlarged to three or four times its natural size. On more accurate examination, however, this turned out to be the sigmoïd flexure of the colon, in such a state of distension that it rose up into the region of the stomach, and filled half the abdomen. The stomach was contracted and healthy. The small intestine was healthy at the upper part: lower down, it became distended, and of a dark colour: and at the lowest part it was much distended, with some spots of gangrene. The colon was greatly distended, being in some places not less than five or six inches in diameter; and the sigmoïd flexure was also enormously enlarged in the manner already mentioned, and of a dark livid colour: it contained only air and thin feces. The rectum was collapsed and healthy. The following appeared to be the cause of this remarkable state of disease. The sigmoïd flexure was found to have taken a singular turn upon itself, so that the rectum lay to the left, in contact with the descending colon; and the ascending portion of the sigmoïd flexure passed in front of this portion, and lay on the right. In consequence of this transposition, the rectum as it descended passed behind the lower curve of the sigmoïd flexure, where it takes the first turn from the descending colon; and the rectum itself at this part received a twist, as if half round. Exactly at the point where this twist had taken place, the distension and dark colour of the diseased intestine terminated abruptly, and the remainder of the gut became white and collapsed. At this point, however, there was no mechanical obstruction, for the part was quite pervious, and, except by the slight twist, perfectly healthy.

In this singular case also, Dr. A[illegible] [illegible] I had an opportunity of [illegible] during life. For [illegible] death, having [illegible] to examine the [illegible] when I found [illegible] to correspond with [illegible] a very singular [illegible] which however [illegible] withdrawn without [illegible] point, and [illegible] was retained [illegible] [illegible] have already stated, the distended intestine contained only air and fluid feces.

D. *Malignant disease.* Where the disposition to medullary sarcoma, melanoma, or gelatiniform sarcoma exists, these different growths accumulate in clustered nodules of various sizes upon all the peritoneal surfaces. The omentum thus, or even a single massive growth from the abdominal parietes, may form a sensible moveable tumour in the abdomen. The functions of the bowels are not usually deranged.

Medullary sarcoma. [*q.* 160 to *q.* 165.] These preparations are from the body of Elizabeth Taylor, whose case is given at page 236. This patient gradually sank, and died on the th of October, 1835. The peritoneum was covered with nodules of medullary sarcoma, here and there mixed with melanoma. The pleura reflexa was in the same state. In the lungs were many small tubercles, the largest of the size of a hazel nut, some of medullary sarcoma, others of melanoma, others of the two structures mixed. Upon the fore-part of the heart, a mixed tubercle was found. In the spleen another. In the liver two. There were many below the integuments of the chest and belly, and a few on the back. The inguinal glandular swelling was partly medullary sarcoma, partly melanoma. There was no disease or induration of the cicatrix at the part where the tumour had been removed. The tumour, which has been described as of a dense, white, crisp texture, with membranous bands intersecting it, had the peculiar fetor of a cancerous ulcer, and exuded matter from its surface. There were parts, however in which upon a section of it being made, a greyer colour showed itself between the white bands, which was probably melanotic.

Melanoma. [*q.* 170. 171. 172.] Black nodular masses o various sizes growing immediately behind the peritoneum.

Gelatiniform sarcoma. [*q.* 180. 181.] Nodular masses the colour of size, in disposition like the preceding; a on a section looking like little agglomerated spheres of gl in cysts of a membranous substratum.

SECTION VII.

Hernia.

An abdominal hernia is the protrusion of part or parts of one or more viscera through some outlet in the walls of the abdomen, the reflected peritoneum being pushed before the protruding viscus so as to form a *sac* which immediately contains it. The force, which extrudes the viscus through the walls of the belly, is the pressure of the abdominal muscles and diaphragm. The extrusion is sometimes sudden and instantaneous; generally, however, it takes place by slow and almost insensible degrees. The weak part of the abdominal wall is commonly slow to yield, so that at first a fulness only is observed; which, however, gradually becomes a circumscribed tumour, the contents of which receive an impulse on the patient coughing. As the bowels are perpetually shifting their place, the same viscus is not always opposed to the yielding part of the parietes. Even in the first stage of an abdominal hernia, the viscera feel the disorder: a sense of weakness and internal uneasiness, with flatulent distension and pain, frequently recur, at the part which is in progress of yielding. In general, the patient first learns the existence of a hernial tumour through his attention being directed to the part by the recurrence of these feelings.

The differences in herniæ are founded upon — the place of protrusion — the nature of the sac and its contents — the variable conditions of the contents of the sac.

I. Herniæ are divided from the place of their escape into oblique inguinal, direct inguinal, crural, umbilical, ventral, perineal, vaginal, pudendal, thyroïdeal, ischiatic, diaphragmatic.

1. An *oblique inguinal hernia* escapes from the abdomen by the internal ring, and descends along the spermatic passage. When not of length enough to pass beyond that

passage, it is termed a bubonocele; when extended considerably beyond the outer ring, it is called scrotal or labial. There are naturally two narrowings in the parts which form the spermatic passage, one situated at each ring: the neck of the sac may therefore be compressed, or stricture be produced either at the inner or outer ring, or at both. The common seat of constriction is the internal ring.

The epigastric artery is situated in the inner pillar of the internal ring.

The spermatic cord is commonly situated behind the hernial sac, but occasionally it has been found before the sac. In these instances its component parts have been separated by the tumour, the vas deferens has passed on one side of the sac, while the spermatic vessels ran on the other: or the former has been on the anterior and inner, while the vessels were placed on the posterior and outer part of the swelling. In other instances the vessels have been before, and the vas deferens behind the sac. "The separation of the vas deferens and spermatic vessels," observes Mr. Lawrence, "is seen on both sides, in a case of old double-scrotal hernia now lying before me. They are about two inches apart, and at the back of the sac on one side; and more considerably separated on the other, where the middle of the tumour has penetrated between them, so that they run quite laterally. Lower down they advance anteriorly to the testicle, so that they would probably have been divided by prolonging the incision through the whole length of the sac, particularly if it had been directed a little to one side."

Oblique inguinal herniæ are more frequent in men than in women, and on the right side than the left.

Oblique inguinal herniæ, that are down frequently or for a considerable period at once, gradually render the spermatic passage less oblique, so that they come externally to resemble the next kind.

2. *A direct inguinal hernia* escapes through the abdominal walls behind the external ring, and protrudes directly through the latter. This kind of hernia is of rare occurrence, owing to the strength which the parietes of the abdomen derive at this part from the insertion of the tendon

of the transversus into the linea ileo-pectinea. But this attachment is sometimes congenitally deficient; and when it is perfect, it is liable to be forced through by pressure from within, or to be gradually extended and elongated so as to protrude as a fibrous membrane covering the sac through the external ring. In direct inguinal hernia there is but one parietal stricture.

3. *Crural, or femoral hernia.* The crural opening, or that through which crural hernia descends, is situated immediately behind the inner part of Poupart's ligament, which forms its anterior boundary: the inner boundary is the ligament of Gimbernat: the posterior boundary the body of the os pubis and the pectineus muscle: the outer boundary the iliacus internus and psoas magnus with the external iliac vein and artery lying upon the surface of the latter. The crural opening is the channel for transmitting the femoral vessels, which with adipose tissue and one or two lymphatic glands naturally fill it. An hernia finds passage here through the displaceableness or compressibility of these substances, while it extends or breaks through the fascia that stretches from the ligament of Gimbernat to the sheath of the vessels. The crural opening is considerably narrower than the inguinal opening. The sharpest edges of the opening are the anterior and the inner; or are formed by Poupart's ligament and Gimbernat's ligament. When an operation is necessary, the surgeon has his choice of dividing either of these ligaments: a section backwards would reach the bone, a section outwards would endanger the femoral vessels.

The division of Poupart's ligament is thought to weaken the inguinal parietes; nor can it be made without some risk to the spermatic cord. The division of Gimbernat's ligament close upon and in a direction parallel to Poupart's ligament is preferable: the section need not exceed a third of an inch in length. This operation is not, however, wholly free from objections: when the obturatrix artery takes its origin (which happens once in five times) from the common femoral, it would wind half round the neck of the sac of a crural hernia: generally, indeed, it is found to pass behind he hernia, and then is safe; but sometimes it lies before the neck of the sac, and is liable to be divided even by the most skilful and cautious operator. In strangulated crural hernia there is but one stricture, as far as the abdominal parietes are concerned.

4. *Umbilical herniæ* are either congenital or otherwise.

Congenital umbilical herniæ protrude through the navel, or more strictly through the umbilical ring, or passage for the navel string through the abdominal parietes. The umbilical ring consists in its upper half of strong, semicircular, tendinous fibres, with a well-defined margin, forming an arch under which the vein passes, connected to it by loose cellular tissue: the lower half is not so strong or well defined, and its tendinous fibres are attached to the umbilical arteries, so that these parts cannot be separated without cutting these fibres. The tumour in congenital umbilical hernia appears as if formed by the dilatation of that extremity of the umbilical cord which is connected to the child's body. Generally it has a more or less conical figure: the basis is attached to the abdomen, and the round tendinous opening by which the viscera protrude, occupies its centre: the umbilical cord appears to arise from the apex of the swelling. The coverings are thin, soft, and seem transparent, so that the contents can be readily perceived externally. The external surface is polished, and exactly resembles, both in appearance and structure, that of the cord. The base of the swelling is covered, for a short extent, by integuments. Internally the cavity presents a smooth peritoneal production, which lines it throughout. The umbilical vessels are generally divided by the swelling; the vein going above, and the arteries below or on one side.

Umbilical herniæ that are not congenital occur either soon after birth, or later. In the former case they commonly protrude through the umbilical ring, and are to be attributed to its closure not being sufficiently rapid and perfect. In the latter case they commonly escape on one side of the obliterated umbilical ring. The causes which lead to their occurrence are, distension of the parietes of the abdomen through adipose enlargement of the mesentery and omentum, or by pregnancy.

In strangulated umbilical hernia there is but one parietal stricture.

5. *Ventral herniæ* are such as protrude through the anterior or lateral parietes of the belly at any openings besides the specific passages separately enumerated. The last described kind of umbilical hernia is therefore properly a ventral hernia.

The most frequent seat of ventral herniæ is at the interval between the recti abdominis above the navel. They have been seen in this situation from the size of an olive to that of the fist, or even of a man's head. The smaller ones occur in the scrobiculus cordis, or at the sides of the ensiform cartilage. Protrusions through the linea alba are much less frequent below than above the umbilicus. The linea semilunaris, the hypochondria, the sides of the belly between the ilea and the last ribs, or the lumbar regions, may be the seats of ventral ruptures: but such cases are rare. The opening through which the parts are protruded is usually considerable in ventral hernia, more particularly in such as do not happen in the linea alba. Hence the tumour is broad and flat, the basis being the largest part: hence also it generally disappears or is very easily reduced in the recumbent posture, and is very seldom strangulated.

6. *Perineal herniæ* escape from the pelvic boundary of the abdominal cavity between the rectum and bladder, rupturing or stretching the fascia which extends from the one to the other and to the sides of the pelvis, and protrude between the fasciculi of the levator ani, or between that muscle and the sphincter, forming a tumour in the perineum generally to one side of the raphe. Most of the examples have occurred in the male sex.

7. *Vaginal hernia* is opposed by or escapes through a production of fascia referred to in the preceding instance, and which is reflected, where the peritoneum is reflected, from the vagina to the rectum. The hernia forms a tumour projecting into the vagina, either at its back or lateral part, and covered by its proper tissues.

8. *Pudendal herniæ.* Tumours of similar origin or place of escape with the preceding, but which, instead of pro-

jecting towards the vagina, descend parallel to the vagina, and make their way between the vagina and the ascending plate of the ischium to protrude in the external labium.

9. *Thyroïdeal herniæ, or herniæ at the foramen ovale.* Duverney found on both sides of the pelvis of a female the peritoneum had been forced through the openings at which the obturator vessels pass, so as to form swellings each of which was about the size of an egg. These contained intestine, were placed between the anterior heads of the triceps, and formed an external tumour.

Not to mention other instances, a case is minutely described by M. Cloquet, in which a thyroïdeal entero-epiplocele caused death. It produced no visible external swelling. The tumour was about the size of a small hen's egg, and contained sphacelated intestine and omentum. It was covered by the pectineus and adductor longus, and rested on the vessels and nerves.

10. *Ischiatic herniæ.* A case in which a fatal strangulation of the small intestine took place in this situation is recorded by Sir Astley Cooper. The swelling was small, and its existence not suspected during the patient's life.

11. *Diaphragmatic hernia* may be either congenital, from partial deficiency of the diaphragm, or result from accidental separation of the fasciculi.

The comparative numbers of the different kinds of ruptures may be seen in the following particulars, extracted from the Report of the City of London Truss Society, 1814.

Of 7599 cases, 6458 were males, 1141 females.

Males.	Females.			
1469	14	Left inguinal	4070 inguinal	4665 single.
2567	20	Right inguinal		
38	246	Left femoral	595 femoral	
47	264	Right femoral		
2182	10	Double inguinal	....	2367 double.
36	139	Double femoral		
92	387	Umbilical.		
10	34	Ventral.		
	1	Obturator.		
17	26	Operated on.		

The ages of persons relieved with trusses were as follows: —

524	under	10 years.
384	between	10 & 20
771	....	20 ... 30
1286	....	30 ... 40
1471	....	40 ... 50
1420	....	50 ... 60
988	....	60 ... 70
347	....	70 ... 80
38	....	80 ... 90
2	....	90 ...100

The cases of congenital hernia were 454.

Two patients had each double inguinal and double femoral hernia. Sixteen had three ruptures each; and forty-seven had two of different kinds.

II. *Of the constituents of an hernia.* The constituents of an hernia are the sac and its contents.

1. The hernial *sac*. The protruding viscera, as a general rule, are contained in a special sac of peritoneum. The points of inquiry are, in what respect is the extruded peritoneum altered in its nature; and what are the cases in which a special peritoneal sac is not found?

a. The peritoneum which forms an hernial sac is altered from its natural character at what is called its neck only; that is to say, at that point which is contained in the narrowest part of the passage through the abdominal parietes. There the peritoneum becomes thickened in consequence of the pressure of the tendinous or ligamentous or fascial fibres around it, and that to a degree which renders it inextensible and undilatable. There is but one kind of hernia in which the passage through the abdominal parietes occasionally presents a second separate narrowing; that kind, as it has been already explained, is oblique inguinal hernia. In this instance there may likewise be two peritoneal contractions, one corresponding with each narrowing of the external parts. But it is most important to bear in mind, that the hernial sac is moveable in the canal which contains it, so that the thickened ring or neck of the peritoneal sac may either be forced from within further out, or by pressure from without may be forced back behind the parietes of the abdomen: a new ring or segment of the sac then becomes exposed to the thickening pressure. It is thus always possible, that there may exist upon every hernia several narrowings or strictures. There may be one, the last formed, in the immediate grip of the narrowest part of the passage; there may be additionally one, or even two or more, simply peritoneal. I have never seen more than one peritoneal stricture, in addition to the stricture dependent on present external pressure.

b. The cases in which a special or a perfect peritoneal sac is not found are the following: —

Congenital oblique inguinal hernia: in which a portion of omentum or intestine has accompanied the testis in its descent, or has followed it before the peritoneal canal has closed, preventing its closure. In this case the sac of the hernia is at the same time the serous covering of the testis.

Hernia of the caput coli. The beginning of the colon is not covered by peritoneum for its posterior third: hence, when protruded, it is liable to have a partial peritoneal sac only; or, in one aspect, the muscular coat of the bowel may directly present below the integument and superficial fasciæ, while on the opposite it would have a proper and ordinary sac.

Herniæ without a sac. There is a cast in the King's College museum, taken from a body which was brought into the dissecting-room in Great Windmill Street, in 1829. An oblique inguinal hernia had existed on each side: on the right, the appearances were as usual: on the left, a portion of intestine was down which had no sac; but it was not ascertained whether the want of a sac proceeded from the adhesion of a thin peritoneal sac to the intestine, or from original protrusion through ruptured peritoneum. The former is a more likely occurrence than the latter.

2. The ordinary contents of hernial sacs are either intes-

tine (and then most commonly ileum), or omentum, or both; which cases are respectively denominated enterocele, epiplocele, entero-epiplocele.

The unusual parts in hernial sacs are,—

a. The bladder. This viscus has been found in inguinal, crural, perineal, and vaginal herniæ, combined or not with enterocele, occasionally producing, sometimes following the latter. Vesical hernia has in general a partial sac only; and when the anterior part of the viscus is protruded, without the fundus being drawn into the ring, it will be everywhere adherent by cellular substance, and possess no sac at all. This was the case in an instance recorded by Mr. Pott, where, however, the bladder had descended to the bottom of the scrotum. When the fundus or side have been protruded, the posterior part of the swelling only adheres to the surrounding parts, and there is a bag formed by the peritoneum in front. The cellular adhesions in both cases are such as to render the return of the protrusion impossible. Although the natural connections might be expected to oppose any considerable displacement of this bag, we find that a very large portion of it may quit the abdomen, descending to the bottom of the scrotum, and forming, when full of urine, a very considerable tumour. The part undergoes further changes after it has passed through the ring. It becomes contracted in the opening, and expands again below. Mr. Keate found it contracted at the ring, dilating itself again in the abdomen and pelvis, and forming a kind of double bag divided by the ring. And the same change had occurred to a still greater extent in an instance operated on by Mr. Pott. He discovered a membranous bag, growing narrower as it proceeded upwards; and a membranous duct, about the size of a large wheatstraw, was continued from its upper end through the ring. The urine flowing through this, when it was divided, proved the case to be a hernia of the bladder. Stones have been contained in the protruded portion in many instances.

b. The ovaries were found by Pott, each contained in an inguinal hernia; and by Camper the ovary was found in an indurated rupture. The uterus, Fallopian tubes, ovaries, and part of the vagina, were found, together with some omentum, in a large crural hernia in a patient who died in the Salpetrière, at the age of eighty-two.

c. The stomach, spleen, and part of the liver, have been found in diaphragmatic hernia.

III. *Of the different conditions of the contents of the hernial sac, or of the hernial protrusion.* A hernia may exist in one of these states, it may be reducible, or simply irreducible, or strangulated.

1. A hernia is *reducible,* when the stricture upon it is inconsiderable, and it admits of being returned within the limits of the abdomen. The constant use of a truss is requisite, to prevent the reprotrusion of reducible hernia.

2. A hernia is said to be *simply irreducible,* when without any constriction of the neck of the sac sufficient to prevent its return, or to impede the free passage of *the contents of the incarcerated bowel* to and from the bowels in the belly, *the contents of the sac* are prevented being replaced within the abdominal walls through some other cause. The causes which produce the simply irreducible hernia are,— 1. Adhesion of the contents of the sac to the sac; 2. Their reciprocal adhesion, so as to form a mass too great to be returned at once, though separately each part might have admitted it; 3. The increase of one part — the omentum namely — by excessive growth of adipose substance and induration of the filamentous tissue, rendering it too large and firm to be pressed back. An irreducible hernia requires to be strongly supported by a suspender that fits tolerably closely, with the view of preventing the viscera already down from dragging more after them.

3. *Strangulated* hernia. Obstruction of the bowels has been already described, as it occurs in ileus, in intussusception, in stricture or malignant disease of the great or small intestines, or when caused by peritoneal adhesions within the belly. The common features of all these cases present themselves again in strangulated hernia; the mechanical cause alone is different, which in this instance consists in the neck of the hernial sac being so narrow as to obstruct the passage of the contents of the intestine, when intestine is down; or so to compress the omentum, when that viscus

alone protrudes, as symptomatically to derange the functions of the alimentary canal, and give rise to temporary symptoms of obstruction.

The phenomena and management of strangulated hernia, as they relate to the condition of the protruded intestine, may be conveniently arranged under the following heads:—symptoms of strangulation—cause of strangulation—reduction without an operation—fallacious appearances of improvement in unreduced strangulated hernia—operation—management of protruded intestine—omental hernia.

a. The symptoms of strangulated hernia are three:—1. A tumour at one of the known regions of hernial swellings, the protrusion of which or a change in which will have taken place shortly before the supervention of the other symptoms; the tumour more or less tense, and incapable of diminution by pressure, generally receiving an impulse when the patient coughs, and apparently continuous with the abdominal walls; the tumour generally tender or uneasy on pressure, the tenderness being commonly the greatest at the point where the protrusion begins, and diffusing itself from thence over the adjacent part of the belly. 2. Want of passage through the bowels. 3. Vomiting, at first of the contents of the stomach, then of mucus, finally of liquid having a fecal smell and colour. At the commencement, the tumour is often devoid of pain; its very existence even may be doubtful, from its small size and depth, or from its lying behind another tumour, such as a second and not strangulated hernia. The lower bowels sometimes act once or twice unloading their contents, at the commencement of strangulation. The vomiting at first may be occasional only, and attended with little distress.

b. Causes of strangulation.

One kind of strangulated hernia may be called *acute*, in which the protrusion takes place suddenly in consequence of some violent muscular exertion, the walls of the abdomen not having been previously weakened. In this case the pressure of the small aperture through which the hernia has been forced, directly grips the neck of the sac with force enough to obstruct the passage.

But in chronic cases, in which the protrusion has been gradual, the ring-like aperture, in which the neck of the hernial sac lies, is large enough to permit in general a free communication between the belly and the sac. And this is equally the case, whether the hernia is reducible or otherwise. It is indeed true, that the worst part of the constriction often arises from thickening of the neck of the sac; but even this often exists to a very great extent without the hernia being strangulated. A certain narrowing of the abdominal aperture, and a certain thickening and loss of extensibility of the part of the peritoneum forming the neck of the sac may be viewed as constant qualities, which are present as well before strangulation as during its continuance. In such cases — and they are by far the most numerous — the strangulation depends upon something added to the usual narrowness of the abdominal aperture and neck of the hernial sac. What that something is, is a matter of doubt.

First, Is it spasm? I am persuaded that spasm of the parietes of the passage through which the hernia protrudes, is not the source of strangulation. In no case, except in oblique inguinal hernia, do fibres exist by which spasmodic contraction could by possibility be produced; and in that case I believe they commonly take no part.

Secondly, Is it a straitening of the passage and of the neck of the sac, produced by determination of blood and congestive *turgor?* It is far from improbable that this condition of the parts may contribute to strangulation.

Thirdly, The principal cause of intestinal strangulation appears to be distension of the intestine with air and liquid; the traction so produced of the distended part upon the narrow aperture of the neck of the sac giving a tightness to the portion of intestine lying in it, which produces perfect obstruction.

The second cause adverted to must be supposed sufficient in strangulated omental hernia; the second and third probably combine to produce strangulation in intestinal rupture.

But under the head of causes of strangulation another question has to be considered. How is it that a person labouring under reducible hernia incurs an attack of strangulated hernia? It happens every now and then, that a person, who has been for some years afflicted with reducible hernia for which a truss has been worn, on making an accidental exertion suddenly forces down the rupture anew, when the case presents the features of ordinary acute hernia. But in the majority of instances, the circumstances of the attack are different: nothing precedes it, but, either an indigestion,[1] irregular action of the bowels and flatulency, attended by a sense of pressure on and fulness at the old seat of protrusion, or slight diarrhœa, or smarter bilious disorder: in the midst of which the hernia comes down, often without the patient observing it till strangulation has taken place. The cause of the reprotrusion is distension of the bowels with liquid and flatus; no wonder therefore that strangulation should ensue, considering how much that state of the bowel depends upon distension. Many persons who have chronic hernia, and who have once or twice experienced strangulation, are perfectly aware when they are threatened with another attack, by uneasiness in the region of the rupture accompanying some form of bowel disorder; by lying in bed a few hours, and taking some warm aperient medicine, they commonly succeed in allaying the abdominal irritation and the threatening feelings, of which they know the nature.

c. Reduction without an operation. The first impression upon viewing a strangulated hernia is, that as it has been forced from within the abdomen by pressure outwards, it may be returned by pressure in the contrary direction. And in a large majority of cases, the practice founded upon this idea succeeds. The process is termed the taxis. The patient or the surgeon gently compresses the tumour, and *works it* in the direction of the opening through which it has escaped. By continued, gentle, and varied compression, and urging the tumour backwards, the rupture is often reduced. One constant phenomenon attends the success of this process; the intestine is emptied before it is returned; the patient hears and feels a gurgling sensation of air and liquid passing from the hernia into the belly; the passage through the strangulated part of the intestine being now restored, and the intestine itself passes easily back through the stricture.

The taxis is not to be attempted, if it gives pain. In that case, supposing the attack recent, and these means not to have been already tried, bleeding and the warm bath are to be used, which are sure to lessen the tenderness of the hernia and of the abdomen, after which the taxis may be safely employed. Under these circumstances I have gone on for half an hour with the taxis, without producing any effect; and in another quarter of an hour have succeeded in reducing the rupture.

If the taxis has once been well tried and has failed, what is to be done? This question is decided by the rapidity and severity of the symptoms, by the probable contents of the sac, and in part by the place of the protrusion.

1. If after bleeding and the warm bath, and the taxis ineffectually employed, the symptoms are not aggravated and are not severe, there may be tried,—a purgative injection, the effect of which is to excite an action of the bowels that draws the strangulated intestine back into the belly;—the application of pounded ice over the tumour.

2. It is particularly expedient to wait—the symptoms not having become worse—if the hernia is an oblique inguinal hernia conjoined with an imperfect testis, which is sometimes in the upper part of the scrotum, sometimes drawn within the ring, and now so retracted. In this instance something like an effect of spasm is traceable. Certain it is [the case has occurred to myself], that in such a patient left for three or four hours, the common remedies having failed, the two changes have simultaneously supervened, of the descent of the testis, and the retrocession of the hernia.

3. If the hernia is omental only, it is expedient to wait. It is indeed difficult to determine with certainty, that an hernia is omental only. That it contains omentum, may be known by the doughy feel it presents, and the indistinguishableness of the impulse on coughing. But it is hardly possible to be certain, that behind or within that protruded omentum, no portion of intestine is concealed. Nevertheless, if the tumour is doughy to the feel, if no im-

pulse is communicated on coughing, if the patient is rather better than worse after bleeding and the warm bath and an injection, the presumption is very strong that the hernia is merely omental; and the surgeon is usually safe in administering opening medicine by the mouth, which, acting, relieves all the symptoms.

4. If the hernia is umbilical, it probably contains great intestine only [with or without omentum], and the ring is probably of large size. The symptoms not being aggravated in such a case, almost indefinite delay may be allowed, or even bolder practice. I attended, with Dr. Stewart, an elderly lady, who had long laboured under a large umbilical hernia. It had been strangulated more than once, and as often relieved without an operation. For the last four or five years, it had been constantly down. The attack of strangulation for which I was consulted, had lasted several hours; the vomiting was constant, with tormina, and considerable tenderness of the abdomen and umbilical ring. I recommended that the operation should be performed, which, however, the patient would not accede to. Under these circumstances, Dr. Stewart and myself determined to give a drop of Croton oil every two hours, to force a passage. The practice was successful; and after two doses the bowels were completely relieved, without however the hernia returning.

In strangulated hernia, if a surgeon is in doubt, he had better operate. Many lives are lost by delaying the operation; but I never saw an instance in which life was endangered, or any serious symptom produced, by the performance of the operation. There exists, however, no end to the varieties of the features of hernia; in some cases, it is bad practice to delay the operation three hours from the commencement of the attack: in others, it has been delayed many days without detriment to the patient.

But another important question demands consideration, when the use of the taxis is spoken of. Has this process not its own hazards, even when employed at a seemingly fitting time? The surgeon must always bear in mind, that, if he use too much violence with the taxis, he is in danger always of either rupturing the intestine, or returning it in a state otherwise unsafe into the belly, or of returning together with the intestine the sac, and the peritoneal stricture of the neck of the sac.

The following case I did not witness, but I was assured it happened as I shall describe. A patient laboured under strangulated inguinal hernia: the symptoms not being very urgent, and the tumour not very tender, considerable pressure was used, and at length the greater part of the tumour disappeared. The patient, however, was not much better, became worse, and died. Upon examination, it was found that the bowel had indeed been pushed back, *but that the sac had also been pushed back with it;* the neck of the returned sac, formed of thickened peritoneum, had been sufficient to keep up the strangulation.

A patient (a recent case in the Middlesex Hospital) had all the symptoms of strangulated hernia: there was a small tumour, feeling like an omental hernia, at the crural arch. The patient had a swollen and tender belly, and stercoraceous vomiting. Repeated attempts had been made to reduce the rupture, which the patient said was considerably larger before these attempts had been used. The bowels had acted twice with enemata. I did not attempt to return the tumour, but operated immediately, when I found an empty sac: I divided the neck of the sac. The patient died in thirty hours. On opening the abdomen, the upper part of the small intestine was found distended, swollen, and inflamed. A segment of a portion of the ileum, which had been down, was deeply discoloured, and retained the impression of the close grip of the neck of the sac. It had been forced back into the belly, before the performance of the operation, by the taxis, too much injured for recovery, through the length of time it had been strangulated. The tumour upon which I operated was the sac, with thickened adipose substance partially surrounding it.

4. *Fallacious appearances of improvement in unreduced strangulated hernia.*

a. Diminution in tenseness and volume of the tumour, the other symptoms remaining. I have repeatedly seen inguinal hernial tumours become less in volume, and less tense,—without the urgency of the more important symptoms being suspended,—through the water of the hernial sac being forced by the pressure used into the abdominal cavity. When the operation has been subsequently performed, the serum, which had been forced into the abdomen, has poured out through the neck of the sac, upon the division of the stricture.

b. Disappearance of the tumour, the other symptoms remaining. I recollect seeing the body of a female examined, who had died of crural hernia. She was not my patient; the surgeon, under whose care she had fallen several hours after the invasion of symptoms of strangulation, had resorted to the taxis : he had compressed the tumour till it had disappeared, and in his opinion had been reduced. A small segment of the circumference of the bowel, however, had remained nipped in the sac, and caused death. Whether the diminution and supposed return of the tumour in this case was produced by forcing the serum of the sac into the belly, or by the actual reduction of a part of the protruding bowel, I had no means of ascertaining.

Another suspicious improvement in strangulated hernia, which is the more likely to prove delusive that it very rarely occurs, is *the action of the bowels either not being suspended, or returning:* this circumstance is not incompatible with total obstruction.

A patient was admitted into the Middlesex Hospital, with stercoraceous vomiting, and with frequent purging. His belly was swollen, and tense, and tender; and there was a large swelling of the right side of the scrotum. The lower part of the swelling was distinctly a hydrocele; but the upper part, though to all appearance it was continuous with the tumour, I thought, must be an inguinal hernia: but it had little tension and tenderness, and a very obscure impulse was alone communicated to it on coughing. The *purging continued,* and the stercoraceous vomiting, and the patient grew worse. On the second day I operated : a portion of intestine was found strangulated.

What then are the symptoms on which the surgeon must depend? — unrelieved vomiting, and uneasiness, and tenderness of the abdomen; with which there are gradually associated, distension of the belly, a frequent and wiry pulse, hiccup, a haggard expression of countenance.

5. *The operation.* The first object of the operation is to relieve the constriction, wherever it exists, that causes the strangulation. In cases of strangulated hernia, that were previously *irreducible*, nothing more is contemplated. The protruded part is not returnable, but the passage through it may be restored. But in cases of strangulated hernia before reducible, there is a second object, namely, to ascertain by inspection whether the part protruded is in a fit state to be returned. For both these objects, it is essential, as a general rule, to lay open the sac. The place of the stricture is often not discernible till the sac is opened. The stricture itself is often entirely peritoneal, and cannot be divided without opening the sac. And it is evident that the state of the bowel cannot be seen, till it is exposed to view. I am aware that cases occasionally occur, in which a surgeon may hazard with tolerable security the not opening the sac — I allude to those cases of inguinal hernia in which the strangulation has existed a very short time, and the grip of the external ring upon the sac is strong and close. I have indeed seen this done with success; but I am sure that it is unsafe practice, for the reasons which I have assigned.

Is the surgeon, then, to lay the sac entirely open? This is by no means to be done: an incision into the sac three inches in length, beginning from the ring at which it protrudes, is sufficient even in a large hernia to allow the surgeon to examine the contents of the sac; at the same time that the moderate size of such an incision prevents the bowels falling out upon his hands.

Let me now enumerate the difficulties which the surgeon may encounter in attempting to open the sac, and to divide the stricture.

a. If the integument and subcutaneous layers of fascia are unusually thin, and the intestine in the sac is distended with flatus, the intestine may be cut into in the first incision. I have seen this accident happen. It is hardly attended with danger to the patient, who may almost be viewed in a state of greater safety in consequence of the immediate relief of the distension of the bowels through the wound. If the wound is a puncture merely, it may be secured with a knot of fine silk, the ends cut close off. When larger, I have seen the intestine returned all but the cut part, which is to be fastened by a suture to the integuments. The artificial anus closes in from six to eight weeks.

b. If the sac contain no water, either because none has been formed, or that it has been pressed into the abdomen, and if the surface of the bowel has lost its polish from slight effusion of lymph, the surgeon may be in doubt whether he has yet reached the sac, when he has already divided it. I have seen the peritoneal coat of the intestine punctured under these circumstances, in the expectation that it would prove the sac. It is hardly necessary to observe in this place, that the water of the sac, which is so constantly met with, results from the impeded return of the venous blood of the strangulated part.

c. I met with, in the dissecting-room, an old hernia, which appeared to have no sac. On the opposite side there was an ordinary hernia. A model of the appearance presented is in the museum of King's College. It appeared to me that there had been a hernial sac, the identity of which was lost, through its having become uniformly adherent to the intestine which it contained. If such a case occurred in practice, the surgeon would be almost excusable if he opened the intestine by mistake.

d. It happens occasionally, that an old hernial sac lies contiguous to that which contains the recent and strangulated hernia. An appearance similar to this is sometimes produced through condensation of the filamentous tissue of the groin by pressure. Layers of membrane, closely resembling peritoneum, are liable to be thus formed. I have, however, seen this appearance in crural hernia alone. I recollect a case, in which a sac of this kind was supposed to be the hernial sac, which it contained, and the ligament of Gimbernat was divided, before the mistake was discovered. This mistake is the more easily made, that in such a case the finger introduced within the factitious sac passes under the crural arch, and seems to be contained in the narrow neck of a true sac.

e. A circumstance, which, when it occurs, contributes to strengthen this deception is, that the serous cyst occasionally contains *liquid, the absence of which would otherwise lead the surgeon to suspect that he had not yet opened the sac.* It has not happened to me to meet with an instance where the whole hernial sac has been contained in such a false sac; but I have known a false sac, attached to the outside of a hernial sac, convey the idea that a hernia of the head of the colon, with the characteristic partial sac, presented.

f. There is a complication of these serous sacs with condensed adipose tissue, which completely deceived me. In the first case which I witnessed of this description, the hernia was a crural hernia, and extremely small. After dividing several layers of fascia, I exposed a membrane resembling a hernial sac: upon opening it, I came upon what I conceived to be a nodule of omentum. This I cut through, in the expectation of finding intestine contained within it; instead of this, I came upon the true hernial sac, of remarkably small dimensions, and which I had not before reached. There was strangulated bowel within it.

g. But it is possible that the hernial sac may be properly opened, and yet the neck of the sac escape division.

It is difficult to conceive how the following accident should arise, but I saw a case in which it had actually happened. The case was strangulated crural hernia in a man. The surgeon laid open the sac: the gut was already mortified: there was a question of returning it; but it was necessary to divide the stricture, in order to allow of the free escape of the contents of the bowel at the wound. The surgeon divided what he supposed to be the stricture. The following day nothing had escaped through the wound, and when the finger was passed towards the belly from the cavity of the mortified intestine, it was found that there was no passage; the stricture still existed. Upon carefully examining the wound, it was found that the division of

Gimbernat's and Poupart's ligament had been made external to the sac. Upon then dividing the true neck of the sac, the finger could be passed from the opened and mortified gut into the sound intestine within.

The case is more likely to happen, although it is an extremely rare case, in which a surgeon may have to operate upon a strangulated hernia which has already been *half forced back, sac and all,* within the abdominal parietes. In this case it is obvious, that, upon opening the hernial sac, and passing the finger towards its neck, the surgeon will feel the narrow ring in the abdominal walls at which the protrusion took place: this he will probably be satisfied with enlarging by a slight division; and, unless he is singularly circumspect, and has been quite alive to all the previous circumstances of the case, he may leave within the abdominal parietes an *undivided peritoneal stricture.*

I recently witnessed a case of scrotal hernia, in which, when the sac had been laid open, the bowel disclosed appeared nearly healthy, and the finger could be passed easily into the abdominal ring. There was no stricture in the spermatic passage, or behind it. Upon further examination of the part, it was found that the stricture was a peritoneal one, and situated in the middle of the scrotum, the lower part of which alone contained strangulated intestine. This stricture being divided, some length of mahogany-coloured small intestine was drawn from the bottom of the scrotum, and returned into the belly. The stricture in this instance had been formed, I have little doubt, at the inner ring, through its pressure on the peritoneum, and afterwards had been pushed forwards out of the grip of the ring and into the scrotum finally by additional protrusion from behind.

6. *Management of protruded intestine.*

a. The intestine may be nearly healthy in appearance, or but slightly if at all darker than natural from congestion. In this case it is to be returned.

b. The peritoneal surface may have lost its glossiness, and be inflamed, with here and there small patches of lymph upon it. The prognosis in this case is unfavourable, but the best practice is to return the bowel.

c. The intestine may here and there exhibit a black patch, from extravasation of blood beneath the peritoneal coat produced by pressure on the previous taxis. This is no impediment to returning it.

Before returning protruded intestine, it is of the highest importance to draw down a small additional portion at either end, to *see* whether the part gripped by the stricture be in a state threatening gangrene. I have seen a patient die through neglect of this precaution.

d. If the intestine be partially sphacelated, of a greenish black or brown, or ashen, in patches, or the whole of it, whether already burst or not, it must not be returned. But the stricture having been set free, and the intestine opened, it is to be attached by a suture to the adjoining skin. The contents of the bowel will then freely pass out of the wound, which becomes an artificial anus. The patient's life being preserved, the next thing is to close this temporary aperture. Under some circumstances this is easy. Supposing that of all the intestine in the sac one small part only threatened to be gangrenous, this part alone is opened and retained in the sac, the rest replaced in the belly. Such an opening—there being little lost of the parietes of the bowel—will spontaneously close in from six to eight weeks, if the wound is only kept clean, and encouraged to granulate and draw together. If the loss of substance is greater, the two portions of intestine on either side the slough meet at an acute angle at the artificial anus, their adjacent sides forming a septum down to the opening. To this case the instrument invented by M. Dupuytren, for nipping and strangulating a small portion of the septum, is still applicable, and when used with caution I should think perfectly safe.

e. But the intestine may be neither sphacelated, nor yet so free from discoloration as to make the surgeon confident what would be its progress if replaced. It is not possible to express in words the differences of appearance which will decide the practical surgeon in one of these middle cases to return the bowel, in another to open it. It is not, however, the colour of the intestine alone by which the surgeon ought on this occasion to be guided: he must likewise take into consideration the *quantity* of discoloured intestine; the *age* of the patient; the condition of the bowels within the abdomen; the length of time the strangulation has existed. I have seen patients die at different periods — from two to seven days — after the operation for strangulated hernia, in whom, upon a *post-mortem* examination, the intestine that had been returned has been found either to have mortified subsequently to its replacement, or not to have recovered its colour from the dark and suspicious hue it presented in the operation. These patients have died of peritonitis; and although several would in all probability have died if the unhealthy intestine had not been returned into the belly, I am convinced that others would have lived, if, instead of the whole, the healthiest part only of the protruded bowel had been reduced, and the most discoloured part opened and retained in the sac. In a small proportion of these serious cases, the scale is probably turned against the patient by the bowel being called upon, and being unable at once to recover its healthy state, and to continue its functions. Relieve it by a direct outlet of its contents, and the chance of its self-recovery ought to be, and (I think I have found it so practically) is considerably increased. The artificial anus is of no consequence: it will close in a few weeks. This important question, which has seldom to be discussed except in hospital practice, applies only to cases which have become aggravated through delay and neglect before a surgeon is consulted.

7. *Of omental hernia.*

When a strangulated hernia is merely omental, the patient ordinarily has less pain and distress in the belly and in the tumour, than when the hernia contains intestine: the symptoms are slower in their progress; the bowels are easily unloaded by enemata; the patient is then sensibly relieved; and opening medicines, administered by the mouth, complete his recovery.

There are two reasons for operating in omental hernia: first, although a surgeon can determine by the touch when a hernial sac contains omentum, he cannot tell that it does not contain intestine besides: secondly, a patient may die of strangulated omental hernia alone. I operated in the Middlesex Hospital upon an old man with strangulated omental hernia: there was vomiting, hiccup, and tenderness of the belly. He sank, and died of the peritoneal inflammation, which had been established before the operation was performed.

But what is to become of the omentum, exposed in operating upon either an epiplocele or an entero-epiplocele?

If the omentum is in its natural state, it is to be returned. If, as more commonly happens, the omentum is found enlarged, thickened, and firm, it cannot be returned. In the latter case three modes of practice have been employed, each of which I have tried with success.

1. The omentum may be left in the wound to slough or granulate, when it will cohere with the sac, and plug up the opening. This is perhaps the safest practice; and in an aged person I should again employ it.

2. The protruded part may be cut off by a clean section, and each bleeding vessel tied with a small knot of the finest thread of silk, the ends cut close to the knot. This practice I believe to be perfectly safe if the surgeon secures all the vessels, which he may do.

3. The protruded part may be cut off, and a double ligature passed through the abdominal end, tied round it, and then attached by a suture to the integuments. This method I adopted in a gentleman about thirty years of age. He has had no return of hernia, nor at any time any sense of dragging or traction of the stomach or colon towards the groin, nor any kind of abdominal uneasiness. But I am informed, that, in other cases where this practice has been employed, it has been followed by grave inconvenience of the kind adverted to.

SECTION VIII.

The Liver.

The affections of the liver may be arranged under the following heads: — injuries and hemorrhage — hyperæmia — anæmia — inflammation — abscess — hydatids — atrophy — hypertrophy — steatosis — tuberculous deposit — malignant tumours — biliary congestion — gall-stones — jaundice.

1. A violent blow upon the præcordia is instantaneously fatal: but it is uncertain to what extent the injury of the liver contributes in such cases to the fatal result. Pressure upon the liver, when in its healthy state, produces a painful and subduing sensation.

I was called to see a gentleman who was shot through the side: he lived about eight hours in intolerable pain. The ball had traversed the long diameter of the liver.

Blows on the right hypochondrium are liable to produce rupture of the liver, when the patient dies in from twenty-four to sixty hours, the period being determined by the quantity of the hemorrhage into the peritoneal cavity. [*r.* 1.]

A man sitting carelessly upon the edge of a cart was thrown from it by a sudden jerk upon the road. He immediately got up and scrambled into the cart, which was still in motion, and he did not appear to a person who was along with him to have received any injury; but he soon became faint, and in a few minutes was dead. On inspection, the liver was found to have been ruptured through a great part of the right lobe, and there was extensive hemorrhage in the cavity of the abdomen.—*Abercrombie.*

Sometimes a violent blow upon the region of the liver is followed immediately by pain and extreme depression; but the patient recovers, beginning slowly to mend after twenty-four or forty-eight hours have past. In such cases I have felt persuaded that the liver has been superficially bruised, or perhaps slightly lacerated.

A branch of the vena portæ sometimes spontaneously given way, producing a sort of hepatic apoplexy.

A gentleman mentioned by Andral, apparently in perfect health, on getting up one morning complained of some uneasiness in the stomach, and returned to bed, where he was left alone for some time: when his attendants came again into the room, he was dead. On inspection, there was found in the cavity of the abdomen much extravasated blood, which appeared to have proceeded from a lacerated opening in the substance of the liver; this led to a small cavity full of coagulated blood, and the hemorrhage was distinctly traced to the rupture of a branch of the vena portæ.

2. The different appearances of the liver, in respect to the quantity of blood contained in its vessels, are the following.

a. Hyperaemia of the hepatic veins. Mr. Kiernan has shown, that the usual appearance in a healthy liver, of darker spots meeting a yellow parenchyma, results from congestion of the intralobular hepatic veins. The congestion beyond a certain limit constitutes an abnormal state, or a state of disease. [*R.* 1.]

b. Hyperaemia of the portal veins. When congestion of the portal system alone is present, the peritoneal surface of the liver, or a section of the liver, displays the appearance of yellowish spots meeting a dark parenchyma. In the former case the central vessels of the lobules are congested, in the latter the vessels in the interlobular spaces. [*R.* 2.]

c. Hyperaemia of both systems. In this case the yellow colour disappears from every part of the liver, from the lobules, as well as from the interlobular spaces, the vessels of each being congested.

d. Anaemia. The liver of a pale yellow. It is commonly at the same time firmer than in health.

The preceding appearances may be general or partial.

3. *Inflammation.*

a. Acute inflammation of the liver is a disease of rare occurrence in this country. The appearances which it produces are increased vascularity accompanied with softening, as if the tissue had been macerated in serum.

A lady, aged twenty-eight, suffered a sudden cessation of the menses from a violent mental emotion. She was immediately seized with severe vomiting, and complained of acute pain in the epigastric region extending along the right hypochondrium. After a few hours, deep jaundice took place, with fever, distension of the abdomen, hiccup, and very difficult breathing; and she died on the following day. The liver appeared much enlarged, and when cut into seemed to be infiltrated with a bloody serous fluid. Its upper surface was covered with false membrane, and the right side of the diaphragm was inflamed. The lungs were much gorged with blood. The other viscera were healthy.

b. Chronic inflammation of the liver. The appearances which denote this affection are, increase in firmness of the structure of the liver. The ramifications of Glisson's capsule in the interlobular spaces are more or less thickened and indurated, having the appearance of being infiltrated with semi-transparent lymph. The lobules themselves are compressed, firm, and generally pale. [*r.* 4.] In the following case the quantity of lymph effused appears to have altered the character of the entire structure of the liver.

A man aged forty-five, in the beginning of May 1813, was affected with severe pain in the region of the stomach, which soon shifted into the right hypochondriac region among the lower false ribs: it was much increased by respiration: there was some cough: pulse 120. In the course of two days and a half, he was bled to the extent of ℥145: the symptoms then yielded, and soon after he went to the country. But he did not recover sound health: he had some cough and dyspnœa, with much debility. After some time he became dropsical: the dropsical symptoms increased, with pain in the right side, and he died in the beginning of August.—*Abercrombie.*

Inspection.—There was extensive effusion in the abdomen. The liver was completely changed in its texture, being, through its whole structure, of a dull white colour, and very hard, in many places almost cartilaginous. There was not the smallest portion of it that retained the healthy structure or colour, but it was entirely of the natural size. The lungs and all the other viscera were healthy.

c. Adhesions of the peritoneal surface of the liver to the peritoneal covering of the diaphragm are frequently met with. It is more than probable, that many cases considered to be chronic inflammation of the liver are chronic peritonitis.

4. *Abscess* of the liver.

a. Abscess occurring in acute hepatitis fatal in ten days.

A gentleman, aged twenty-two (15th June, 1817), was affected with pain across the epigastric region, increased by pressure, and accompanied by vomiting and frequent pulse. The case was considered by an intelligent surgeon as gastritis, and was actively treated by repeated blood-letting, blistering, purgatives, &c. Under the use of these means the pain was very much relieved, and the vomiting subsided; but on the 18th, being the third day from the commencement of the symptoms, he was seized with very deep jaundice. Dr. Abercrombie saw him on the 20th. His pulse was then from 90 to 96, and soft; the bowels were open; very deep jaundice continued; but there was little complaint of pain, except some uneasiness on very firm pressure in the region of the left lobe of the liver. On the 21st, there was no change, and very little complaint; but on the 22d, the pulse rose suddenly to 140, without any other change in the symptoms. It subsided at night, but on the 23d was at 160: there was much febrile oppression, and very deep jaundice, with restlessness, slight pain upon pressure, and some tension in the region of the left lobe of the liver. The usual remedies were persevered in, without any effect in controlling the disease. On the 24th this patient continued in the same state, with an anxious febrile look, and died on the 25th.

Inspection.—The left lobe of the liver contained several small abscesses, full of purulent matter; and there were also several abscesses in the right lobe in the part most contiguous to the left. In other respects, the whole substance of the liver, except a small part at the lower extremity of the great lobe, was very much softened and broken down, and of a very dark or nearly black colour. Both the hepatic duct and the ductus communis were obstructed by large calculi; and a large accumulation of bile appeared to have taken place in the substance of the liver, which flowed out freely when the ducts were laid open. The other viscera were healthy.

b. Abscess produced by acute hepatitis, the patient surviving the attack in which the abscess originated.

A lady, aged fifty-one (23d October, 1816), was affected with incessant vomiting, and severe pain in the region of the stomach, much increased by pressure, and extending downwards towards the umbilicus; bowels open; pulse 84: the symptoms had continued twenty hours. She was treated by repeated blood-letting, blistering, full doses of calomel, &c. In the evening of the 24th there was considerable relief of the pain, but it returned on the 25th with much severity: it was fixed in the region of the stomach, and was increased by inspiration; and tenderness on pressure extended over a great part of the abdomen; there was less vomiting; pulse 120, and small; bowels open: after further bleeding there was again much relief of the pain; she breathed with more freedom, and was free from vomiting; pulse 108. On the 26th the pain returned with much severity, and continued with little abatement on the 27th and 28th. It was chiefly referred to a spot immediately below the ensiform cartilage, and extended into the region of the left lobe of the liver, where there were some tension and tenderness on pressure. She was now free from vomiting; the bowels were quite open, and the motions dark-coloured; the pulse varying from 100 to 120. She was now chiefly treated with calomel, digitalis, and blistering. On the 29th the symptoms began to subside; and in a short time she was able to be out of bed, and seemed to be convalescent. But it soon appeared that she was not free from the effects of the attack. She had occasional uneasiness in the region of the stomach and liver, with severe nausea, occasional vomiting, and œdema of the legs; pulse sometimes natural, and sometimes rather frequent. The pain recurred in paroxysms, which often extended through the whole abdomen; and she was liable to attacks of vomiting, which continued severe for a day or two at a time, and then subsided. Her most permanent and uniform complaint was of constant and severe nausea; and her general aspect was pale and exhausted, but without any appearance of jaundice. Some tension was felt in the region of the liver, but it was very obscure. With various remissions and aggravations of the symptoms now mentioned, the case was protracted for four months, and she died, gradually exhausted, on the 27th of February. — *Abercrombie.*

Inspection. — On the upper surface of the liver, towards the left side, there was an abscess, covered by little more than the peritoneal coat, and containing about a pound of thick purulent matter. The greater part of the liver was much softened and broken down; and the gall-bladder contained a great number of biliary calculi of various sizes. There were some small abscesses in both kidneys. All the other viscera were healthy.

c. Abscess originating in chronic inflammation.

A gentleman aged sixty-seven, and previously enjoying good health, except frequent dyspepsia, had occasionally complained for some time of a pain in his right side, which affected him chiefly when he walked quickly. But he made little complaint, and was not confined to the house until about three weeks before his death, when he had some irritation of his bowels, with loss of appetite, and an obscure uneasiness across the epigastric region. After another week he was confined to bed, his chief complaint being the frequent irritation of his bowels: the stools were scanty, and composed chiefly of bloody mucus. Dr. Abercrombie saw him only a few days before his death: he was then considerably exhausted; the pulse feeble, but little increased in frequency; the bowels still troublesome, but kept in check by opiates. There was obscure uneasiness across the epigastric region, but without tenderness; and no fulness or hardness was to be discovered either there or in the region of the liver. There was an aphthous state of the mouth, with great difficulty of swallowing, a great deal of hiccup, but no vomiting and no jaundice. From his exhausted state, there was no room for active treatment: he died, gradually exhausted, a fortnight from the time when he was first confined to bed.

Inspection.—The liver appeared to be considerably enlarged, and the right lobe was found to have almost entirely degenerated into a large abscess, containing fully three pounds of thick purulent matter, the proper substance of the liver merely forming a very thin cyst around the cavity. At the cardiac orifice of the stomach there was evident inflammation of the mucous coat, with a deposition of flocculent matter; and this appearance extended along the whole course of the œsophagus, with much deposition of flocculent matter in thin layers in different places. There were various adhesions of the intestines to each other: internally, the small intestine was healthy; but in the mucous coat of the colon there was extensive ulceration, mixed with fungous elevations, which extended in a greater or less degree along the whole course of it, and even into the rectum.

Abscess of the liver may break into the stomach [*r.* 5.], or into the great intestine, and, having a free vent, gradually contract and heal: or the abscess may point externally, either through the abdominal walls, or in the right hypochondrium between the lower ribs [*r.* 6.], or it may break through the diaphragm into the lungs. In the latter case, the presence of bile in the sputa is not necessary, or likely; as, on the other hand, a yellow tinge resembling bile in the expectoration, has sometimes existed, when after death it has been ascertained that no communication had ever taken place between the liver and lungs. Abscess of the liver is liable to be produced by irritation from the lungs. The preparation [*r.* 9.] is from a boy, who died of abscess of the lungs coming on after an ear of rye had slipped down the trachea: the ear of rye was found lying in an abscess common to the right lung, the diaphragm, and the liver.

d. Numerous small abscesses are liable to occur, either in groups of five or six small adjacent irregular cavities [*r.* 10.], or dispersed singly through the liver. I met with the latter appearance in the liver of a man about fifty years of age, who died, after three days' illness, of suppression of urine.

5. *Hydatids.*

Hydatids are of frequent occurrence in the liver, and are found either in cysts attached to its outer surface, or imbedded in its substance. The cysts in which they are contained are sometimes lined with a thick coating of false membrane, and not unfrequently there are found in them portions of bone. A liver which contains hydatids may be enlarged and otherwise diseased, or it may be quite healthy with the exception of the cyst which is imbedded in it. There are no symptoms which mark the presence of hydatids in the liver, distinct from those of the other chronic affections; and they have been found where patients have died of other diseases without any symptoms referable to the liver.

In a case which occurred in the Middlesex Hospital, under the care of Dr. Macmichael, a cyst in the liver containing hydatids burst into the lungs; and for a long period the hydatids, with a yellowish mucus, continued to be expectorated. All doubts as to the nature of the case were removed by the post mortem examination, which I witnessed.

Cysts containing watery matter confined under the peritoneal coat of the liver are occasionally met with. These cysts may appear either upon the convex or concave surface of the liver. The following remarkable example is related by Dr. Abercrombie.

A man, aged thirty-two, was affected with an immense tumour of the abdomen, which filled the greater part of it, extending from the region of the liver considerably below the umbilicus, and into the left side. At the upper part, near the ribs on the right side, there was an evident fluctuation. This was most remarkable when he was in the erect posture; in the horizontal posture it seemed as if the fluid retired under the ribs: no fluctuation was perceived in any other part of the mass. His breathing was much oppressed and laborious, especially when he attempted to turn on the left side; he then seemed in danger of instant suffocation; for several minutes gasping in the utmost agony before he recovered his breath: similar attacks were produced by other causes, especially any bodily exertion. He was much emaciated; and the complaint was of about a year's standing. A puncture was made on the spot where the fluctuation was felt; clear serous fluid was drawn off to the amount of nine or ten pounds, and the opening continued to discharge freely for a good many days. By this evacuation he was very much relieved; but his strength continued to sink, and he died about ten days after the operation.

Inspection. — The liver was very little enlarged. The tumour was found to consist of an immense sac formed on the convex surface, under the peritoneal coat; it was of such a size that it had, on the one hand, pressed down the liver below the umbilicus, and on the other had pressed the diaphragm upwards as high as the second rib. The right lung was consequently compressed into a small flaccid substance less than a kidney; the left lung also was much diminished in size, and the heart was as small as that of a child of five or six years. This immense cyst adhered firmly to the posterior half of the diaphragm; but betwixt it and the anterior part of the diaphragm there was a distinct cyst, containing a watery fluid. It was this which had been opened in the operation; the great cyst was entire, and contained 18 lbs. of transparent colourless fluid. Its parietes were firm and dense, like the peritoneum very much thickened. In the bottom of the cyst there were found two singular bodies, consisting of flat cakes of a soft gelatinous matter rolled up into solid cylinders: when unrolled, they were about ten inches in diameter, and about one-eighth of an inch in thickness, and had the appearance of a deposition which had been separated from the inner surface of the cyst. The liver was not diseased in its structure, and the other viscera of the abdomen were healthy, but remarkably displaced, the stomach being on the left side and the pylorus towards the left os ilium.

A remarkable circumstance in this case was the uncommon firmness of the tumour, which imparted the idea of an immense mass of organic disease, without any fluctuation, except at the part which was opened. A case considerably similar occurred in the Infirmary of Edinburgh many years ago, under the care of the late Dr. Gregory. It was supposed to be an immense enlargement of the liver; but one day the whole hardness suddenly disappeared, with a feeling to the patient of something bursting internally. Fluctuation then became evident, though none had been perceived before. The patient died next day, and it was found that this remarkable change had taken place by the cyst bursting into the cavity of the peritoneum. Mr. Annesley mentions a case in which there was attached to the concave surface of the liver a cyst containing a quart of watery fluid, with a hydatid floating in it. Dr. Hastings has described a similar case, in which a week before the death of the patient nine pounds of fluid were drawn off from a cyst of this kind. Sir Benjamin Brodie has described two cases which were supposed to be of this nature, but which were relieved by the evacuation of the fluid. In the one, a young lady of twenty, the relief was permanent; the quantity of fluid evacuated was three pints. The other was an hospital case, a boy who was dismissed in good health after the evacuation of a pint and a half.

6. *Atrophy*. In those who habituate themselves to the use of ardent spirits the liver is found contracted, while its surface and edges are furrowed and notched. These appearances result from wasting of the liver. At the lines, where the surface is furrowed, the lobular structure has partially disappeared, and the interlobular tissue is unusually distinct. Atrophy of the liver is liable to be combined with inflammatory thickening of Glisson's capsule [*r*. 34.], and with partial biliary congestion. [*r*. 35.]

Diminution of the size of the liver, with induration, is liable to occur where the use of ardent spirits has not been indulged in.

7. *Hypertrophy of the liver*. In a case by Andral, of disorder of the liver connected with disease of the heart, the liver would distinctly enlarge during the cardiac paroxysm, and subside when the attack was relieved by blood-letting. Cases of this description belong more properly to the head of hyperæmia.

a. *Simple permanent enlargement* of the liver is an extremely rare affection in adults. The following case serves to exemplify this disorder, as it occurs in young persons of a scrofulous habit.

A boy aged eleven, in the winter 1811-12, was seized with great enlargement of the glands under the jaw, his neck being completely beset with a chain of them of a very large size, extending from ear to ear. He improved considerably during the summer; but in the following winter he became languid and impaired in strength, with variable appetite and irregular attacks of fever. In the following summer he was affected with cough and dyspnœa, and it was now discovered that his liver was so much enlarged, that the edge of it was distinctly felt as low as the umbilicus. He had a wasted and withered look, with cough, frequent pulse, enlargement of the abdomen, and anasarca of the legs; the latter increased to a prodigious degree, and he died after protracted suffering in October 1813.

Inspection. — The liver extended rather below the umbilicus, and so much into the left side as to fill the upper half of the abdomen. It was a little paler than natural in its colour, but in other respects was scarcely altered from the healthy structure. There was extensive disease of the mesenteric glands. The lungs were slightly tubercular, and there was a chain of enlarged glands, some of them as large as walnuts, extending behind the lungs from the bifurcation of the trachea to the diaphragm; some of these were of cartilaginous hardness, others contained thick purulent matter, and in others there were hard calcareous particles. There was considerable effusion in the abdomen.—*Abercrombie.*

b. Hypertrophy, *with induration*, is the consequence of slow inflammatory action, and perhaps would find its proper place under the head chronic hepatitis.

A lady, aged forty-five, had long been liable to dyspeptic complaints; but she was often for a considerable time together entirely free from them, so that no suspicion had been ever entertained of the presence of organic disease. She also frequently complained of pains in the back, neck, and shoulders, which had merely a rheumatic character. In autumn 1818 she went to Harrowgate, and seemed to derive much benefit from the use of the water. In the following winter she was again a good deal confined, complaining chiefly of wandering rheumatic pains, with bad appetite, very bad digestion, and a feeling of oppression across the region of the stomach. On examination, the liver was now found to be much enlarged and very hard, but without pain or tenderness. In January 1819 she began to lose flesh and strength; the pulse became small and frequent, with difficulty of breathing, and effusion in the abdomen; and she died, gradually exhausted, in the end of February.

Inspection.—The liver was very much enlarged, so as to extend quite into the left side of the abdomen, and to descend three or four inches beyond the line of the ribs: in the epigastric region, its margin formed an adhesion to parietes of the abdomen. Internally, it was entirely inged from the healthy structure, being of a pale or ash iour, and very firm in its texture; in many places nearly rtilaginous: scarcely any part of it retained the healthy ppearance. There was considerable effusion both in the lomen and the thorax, but the intestines and the lungs re healthy.—*Abercrombie.*

8. *Steatosis of the liver.* A substance resembling wax or adipocire is found in the liver, producing what on the analogy of a like disease in the voluntary muscles may be termed steatosis of that organ. This substance is sometimes found in irregular portions mixed with the healthy structure, and sometimes in small nodules like peas dispersed through the substance of the liver [*r.* 39.]: in some cases the whole liver, or a large part, is found changed into an uniform mass of this appearance. [*r.* 40.]

9. *Scrofulous deposit* is of rare occurrence in the liver. Sometimes it forms small tubercles, which slowly suppurate [*r.* 50.]; in other instances it exists in longer round masses, with general enlargement of the organ.

10. ***Malignant tumours.***

a. ***Medullary sarcoma.*** [*r.* 58. 60. 61. &c.]

A gentleman, aged sixty-seven, had been for many years dyspeptic, but without any affection of his general health till the spring of 1820, when he began to decline considerably in flesh and strength, and complained chiefly of a feeling of oppression about his chest. He went to the country and improved considerably, but in May he became worse. His chief complaint was then of a fixed pain in the lower part of his back, with restless nights: he was able to take a good deal of exercise on horseback; but complained, that, after riding, the pain in his back was increased. He came to Edinburgh in June. He was then a good deal fallen off in flesh and strength, and his pulse was a little frequent; but his appetite was good, and he made no complaint of his digestion: his chief complaint was still of a fixed pain in the lower part of the back. On examination, nothing was discovered in his back; but a mass of disease was felt in the abdomen, extending from the ribs to near the spine of the ileum chiefly on the left side. It was not at all painful on pressure, and he could give no account of the origin or progress of it, having never taken notice of it until it was pointed out to him. There was now a gradual failure of strength without any urgent symptom. His appetite and digestion continued tolerable until eight or ten days before his death, when he began to have nausea with thirst, foul tongue, and impaired appetite; and he died, gradually exhausted, in the beginning of August. His bowels had been throughout natural or easily regulated, and the motions quite natural.

Inspection.—The whole liver was enormously enlarged, especially the left lobe, which descended nearly to the spine of the ileum. Externally it was of a very dark colour, variegated with light ash-coloured spots. Internally it was composed chiefly of numerous round tubera, of the size of small oranges; they were generally of a white or ash colour, some of them approaching to a scirrhous hardness, others of a softer consistence, and some of them contained a fluid of a puriform character. In the interstices betwixt these tubera there were portions which retained the appearance of the proper structure of the liver, but they were of very small extent, dark coloured, and of a soft consistence.

It appears that the form of disease which occurred in this case is sometimes much more rapid in its progress. A man mentioned by Andral died with fever, vomiting, and pain in the right hypochondrium, having begun only about a month before to complain of some uneasiness in the region of the liver. The liver was much enlarged, and presented a mixed mass of disease, scirrhous, encephaloïd, and tubercular.

b. Melanosis. [*r.* 70. *r.* 71. *r.* 72.]

c. Gelatiniform sarcoma. This appearance is described by Portal as occurring both throughout the substance of the liver and on its surface, raising the peritoneal coat into irregular soft tumours, accompanied with great enlargement of the liver. The case was of several months' standing, and was distinguished by pain in the epigastric region and vomiting, at first occasional, but becoming gradually more frequent: there was progressive wasting, and at last dyspnœa and anasarca.

11. *Biliary congestion.* This occurred in a case by Boismont to such an extent as to make the liver resemble a large undulating cyst. The appearance was found to depend upon a remarkable distension of all the biliary vessels with dark-coloured bile, and was accompanied by wasting of the proper substance of the liver. The distension had been caused by an obstruction of the common duct through a membranous band which passed over it.

A lesser degree of biliary congestion is more frequently met with, invading a part or a whole of the liver.

Preparation [*r.* 35.] exemplifies partial biliary congestion combined with atrophy. General congestion I have seen combined — with thickening of Glisson's capsule, and a bright yellow colour of the whole liver; the bile distending the minute ducts, and exuding from their orifices when divided;—in other cases with a dark green tint of the whole viscus.

Diseases of the biliary ducts and gall-bladder.

a. The ductus communis choledochus is liable to become *obstructed by inflammation*, either rapidly or slowly. In the former case the symptoms are rapid; as in a man mentioned by Andral, who had acute pain followed by jaundice, and a pyriform swelling rising up from under the margin of the ribs. On the fifth day he was suddenly attacked with peritonitis, and died in twenty-four hours. The ductus communis was found much contracted, and at one place obliterated. The gall-bladder and the hepatic and cystic ducts bore marks of having been much distended; the rupture had taken place in the hepatic duct, and much bile was found in the peritoneal cavity. In another case the symptoms of obstruction to the passage of bile had been going on for between two and three months before the fatal attack; and in this case both the cystic and common ducts were found much contracted.

b. The diseases of the biliary ducts are mostly caused by the presence of gall-stones.

Gall-stones, according to Chevreul, are composed of the yellow colouring matter of the bile and cholesterine; the latter predominating, and sometimes forming the entire concretion. Gall-stones sometimes contain a portion of inspissated bile. In some rare instances the cholesterine is entirely wanting. [*r.* 100 to 110.]

The passage of a gall-stone through the duct is characterized by severe but vague pain in the right hypochondrium, and by vomiting; and is often attended with jaundice.

In a lady aged fifty-eight (attended by Mr. North), who had before been occasionally jaundiced, sickness and excruciating pain suddenly supervened; which continued with alternating abatements and exacerbations for a fortnight, when an oval gall-stone was passed, which weighed two drachms and a half: its length was an inch and a third, and its thickness at the broadest part nearly an inch. During *this* attack there was no jaundice.

c. When the gall-stone is too large to pass the common duct, it sometimes causes all the symptoms of intestinal obstruction.

A lady, aged sixty, had been for several years liable to attacks of acute pain in the right hypochondriac region, which generally continued in great severity for a few hours, and then subsided suddenly. On Wednesday, 14th January, 1824, she was seized with pain corresponding to her former attacks, but which did not subside as usual. It continued through the night, accompanied by frequent vomiting and constitutional disturbance. On the 15th there was fever, with frequent vomiting and obstinate costiveness, and the pain was more extended, being referred to a considerable space on the right side of the abdomen. Belly tense and rather tumid. The case had assumed the characters of ileus, and all the usual means were employed with little relief. 16th. There was some discharge from the bowels after a tobacco injection, but it was very scanty. Severe pain continued, with every expression of intense suffering. Her strength sunk, and she died on the morning of the 17th.

Inspection. — Every part of the intestinal canal was perfectly healthy, except the upper part of the duodenum, where there was considerable appearance of inflammation, with remarkable softening, so that it was very easily torn. A large irregular calculus was found sticking in the ductus communis, and the parts were so softened that it came through the side of the duct when it was very slightly handled. In the texture behind the duodenum there was considerable appearance of inflammation. No morbid appearance could be detected in any other organ.

d. If the gall-stone is too large to pass, rupture of the duct may take place, followed by fatal peritonitis.

e. A gall-stone may escape through the sides of the duct, after the union of the latter by adhesive inflammation to the part adjoining.

Several cases are on record, in which large calculi, after producing jaundice, and the other symptoms indicative of having been impacted in the duct, have worked their way outwards, and have been extracted from an opening in the parietes. In a case of this kind mentioned by Dr. George Gregory, after the gall-stone was extracted, the ulcer healed up, the jaundice went off, and the patient, who had suffered excessively for several months, rapidly got well. Several cases of the same kind are mentioned by Morgagni and Haller. In one of them the abscess speedily healed; in another it continued open, discharging a yellow fluid; in a third it discharged calculi at intervals. I have seen, along with Mr. Lizars, a man, about fifty, who has had a billiary fistula discharging for nearly four years. The complaint began with pain in the region of the liver, accompanied by vomiting and jaundice. After these symptoms had continued about three weeks, a tumour formed in the region of the gall-bladder, which was opened, and discharged much fluid of a mixed green and yellow colour, and some small biliary calculi. This opening closed, but another soon took place, which has continued to discharge ever since. The discharge varies in quantity, but is often so profuse as in a very short time to wet his clothes as far as his knee, and in the night to soak through his bed to a great extent. Mr. Lizars at one time collected, in the course of a visit not exceeding fifteen or twenty minutes, about four ounces of a fluid, which on chemical examination exhibited all the properties of pure bile. The man has every appearance of good health, and, except the fistulous opening, there is no appearance of disease in the region of the liver. His appetite and digestion are good, his bowels are regular, and the evacuations of a natural appearance. A case occurred to the late Dr. Graham, of Dalkeith, in which a very large calculus was extracted from an abscess in the parietes of the abdomen; and I believe ultimately did well. It has been doubted whether the very large biliary calculi, which are sometimes discharged by the bowels, had really passed through the duct, or whether they had worked their way by a process of ulcerative absorption into the duodenum or the colon. But I have described a case, in which a large calculus produced fatal ileus after it had passed as far as the middle of the small intestine. The common duct was found so dilated as to admit a full-sized finger, but without any other appearance of disease.

It has been disputed, whether biliary calculi are ever formed in the substance of the liver, or in the gall-bladder only. But Morgagni mentions several instances in which they were found in the liver, and even of great size; and therefore there is no doubt of another point which has been disputed, namely, that they may produce jaundice by sticking in the hepatic duct.

f. The coats of the gall-bladder are liable to be perforated by ulceration, without the presence of bilious concretions.

A man mentioned in the Nouveau Journal de Medicine for 1821, had been affected for more than a month with pain in the abdomen and fever, which had various remissions and aggravations. On the 37th day of the disease, he was suddenly seized with symptoms of the most violent peritonitis, and died on the following morning after suffering inexpressible agony. On inspection, there were found marks of most extensive peritonitis. The inner surface of the gall-bladder presented numerous small circular ulcers from one to three lines in diameter; two of them had entirely perforated its coats, so as to allow the escape of the bile into the peritoneal cavity.

XIII. *Jaundice.*—An ordinary attack of jaundice is cha- terized by yellow suffusion the skin, impaired appe- nausea, the urine being l coloured, the stools white. e following is perhaps t ccount of the pathology t this affection.

yellow colour, which pe ades all the tissues and t of the secretions in jaun . is proved to be owing to presence of bile in them; wl the white colour of the s evidently results from the want of bile in the alimentary canal. The bile has not its proper vent, and is distributed in new places. What is the mechanism of this error loci?

Secretion is the separation of one or more elements from the circulating blood. That separation may be owing,—either to a power in the secerning organ of extracting or drawing from the blood the secretion, *previously not existing as a separate substance in it,*—or to the secerning organ allowing the matter of the secretion, *already formed in the blood,* to strain through and find vent,—or to both these causes conjoined.

The result obtained by M. Simon, in some experiments made upon pigeons, favours the second supposition. He found, that, when the kidneys were removed, the blood became loaded with urea. This single fact would lead us to conclude analogically, that the elements of *all the other* secretions are evolved in the blood in the course of the general circulation, and that the organs in which they are commonly thought to be formed only give them passage. The bile we may thus conclude to be formed, not in the liver, but in the mass of the circulating blood.

Again, secerning organs are liable (to use indeed a doubtful expression) to be palsied; in other words, their secretions are liable to be *suppressed*. The best instance of this phenomenon occurs in the pathology of the kidney: suppression of urine forms a well-marked and very formidable complaint. In this instance another remarkable feature makes its appearance. The secretion being stopped, and the usual vent for the elements of the urine being obstructed, *they appear in other places:* urea has thus been found in the peritoneal serum in cases of suppression of urine.

Reasoning from the above premises, I am disposed to believe that ordinary cases of jaundice depend upon suppression of bile — that the bile, abnormally accumulated in the blood, finds vent in the secretions of other parts, which thence become coloured yellow. Additional circumstances might be mentioned, which corroborate this view. Bile is detected in the blood of jaundiced persons; while the liver in those who have died of jaundice is generally pale, and without bile.

But there are instances of rapid invasion of jaundice, in which the preceding explanation is not sufficient. Mr. North assures me that he witnessed a case, in which an unmarried female, on its being accidentally disclosed that she had borne children, became instantaneously yellow. Now it is not reasonable to suppose that the blood is generally so loaded with bile, or that bile is generally forming so rapidly, that its suppression should produce an *immediate* sensible effect in colouring the skin. I am therefore disposed to conjecture, that such instances are produced through a new cause — through bile being suddenly formed in unusually large quantities in the blood, owing to some influence propagated along the nerves. When a person labouring under an inflammatory attack is bled for it, and happens to become faint from apprehension of the operation, the blood which flows during the faintness is not sizy, while that which follows as soon as the nervousness has worn off, presents the strongest inflammatory crust. If mental emotions can convert sizy into healthy blood, why should they not be sufficient to render healthy blood bilious?

The parallel above drawn between suppression of urine and jaundice (viewed as suppression of bile) admits of being rendered extremely close; for although jaundice in general is not a serious disease, while suppression of urine is commonly fatal (the bile being probably a less noxious element when dispersed in the blood than the urea), it nevertheless sometimes proves so. There are many instances on record, where jaundice has run an exactly similar course to the most rapidly destructive suppression of urine.

A young man, mentioned by Morgagni, was seized with jaundice after agitation of mind. It was attended with pain of the stomach and vomiting, but no fever. On the second day he was dull and forgetful, on the third he was convulsed and then comatose, and he died on the fifth. The liver was found only flaccid and pale; there were some red points on the mucous membrane of the stomach, and turgid glands in the abdomen. In the head there was slight effusion on the surface of the brain, and a considerable quantity about the spinal cord. Another young man, mentioned by the same writer, was very much frightened by having a musket pointed at his breast. Next day he was jaundiced; soon after delirious; then convulsed; and he died in twenty-four hours from the first appearance of the delirium. No disease could be detected, except turgescence of the vessels on the surface of the brain. Dr. Marsh also mentions two cases in which jaundice came on suddenly during the use of mercury, and was fatal with delirium and coma.

c. Obstruction to the escape of the bile, such as that produced by gall-stones, by the pressure of external tumours, by spasm of the ducts, or by chronic inflammation and thickening of Glisson's capsule, may be supposed to operate in producing jaundice, much as retention of urine produces diminished secretion of urine. Either there is a sympathy between the excretory apparatus and the secreting organ, or a mechanical effect produced by distension of the former upon the action of the latter, which in both the cases adverted to diminishes the quantity of the secretion. But when the urine is the secretion diminished in quantity, there is no sensible evidence in the system of the accumulation of urea in other organs; while, if the bile is the secretion repressed, there is plenty of evidence of the fact in the pervading bilious tinge.

SECTION IX.

Pancreas.

1. *Inflammation.* Dr. Baillie found an abscess of the pancreas in a young man who had a good deal of pain in different parts of the abdomen, with spasms of the abdominal muscles, but did not complain of any fixed pain in the region of the pancreas: there was sickness with distension of the stomach, especially after eating, and a tendency to diarrhœa, and at length he became dropsical. A gentleman mentioned by Dr. Percival had jaundice and bilious vomiting; a tumour appeared at the epigastrium; his strength failed; blood and fetid pus were discharged by stool; and he died exhausted in three months. The pancreas was found greatly enlarged, and contained a considerable abscess: the ductus communis was obliterated by the pressure.

Inflammation of the Pancreas. A lady aged twenty-one, when between five and six months advanced in pregnancy, lost her usual healthy appearance, and gradually became very pallid. She was singularly troubled with thirst, and drank cold fluids in such large quantity, as to lead her mother to represent to her that she feared the circumstance might prove injurious to the child. She also suffered much from pain in the epigastric region, which was sometimes so severe as to oblige her to retire to her apartment. Her mother, in mentioning this circumstance, afterwards drew her hand across the abdomen on the seat of her daughter's sufferings, effusion of serum into the right cavity of the chest. The gall-bladder was distended to a great size, so as to contain eight ounces of fluid. The distension arose from an enlargement of the pancreas, the head of which formed an irregular sphere four inches in diameter, which had compressed the gall-duct: the rest of the gland was likewise enlarged. In parts it preserved its natural texture and colour: at other parts it was infiltrated with tuberculous matter, which at two or three points had softened, and formed thick pus. One or two lacteal glands were softened, and contained tuberculous matter. Three or four small scrofulous tubercles were found in each of the kidneys. The left pleura was coated with recent lymph: the fluid which it contained was a dark amber-coloured serum. The thymous gland was enlarged to a considerable size, and formed with the adjacent lymphatic gland a mass, which was extensively infiltrated with tuberculous matter, which at the posterior part had softened. The upper cava passed through the mass, and divided in it; the right vena innominata was greatly compressed by it; the left less so: nodular projections of the tumour pressed upon and had caused thinning of the vein, and projected into it.

2. *Malignant disease* rarely attacks the pancreas alone, but involves in common with it either the stomach, or liver, or both.

A gentleman, aged thirty-five, died after an illness of about eighteen months' duration, in which it was to the last impossible to say what organ was the seat of the disease. His complaints began with a febrile attack, which left him weak; and from that time he was liable to dyspeptic symptoms, with variable appetite, and undefined uneasiness in the epigastric region. He gradually lost flesh and strength; and when he consulted Mr. Newbigging, in January 1822, he was found thin and weak: but Mr. N. was particularly struck with his remarkable paleness, even his lips and the inner surface of his mouth being entirely without colour. About this time he had some vomiting, and was feverish for a day or two; but these symptoms soon subsided, and left him in his former state: appetite variable and capric num, was completely obstructed: in the rest of its course it was not only pervious, but it was larger than natural, and contained a brownish fluid of rather a yellowish tint, resembling in some respects the fatty matter in the state that it was when it passed from the intestine. As it escaped, however, at the time the duct was opened, the opportunity was lost of particularly examining it."

Some remarks upon this subject by Dr. Elliotson, contained in the same volume, seem to disprove a connection of morbid phenomena, or the dependence of the formation of oil in the feces upon the state of the pancreas. The general organic derangement with which this formation is coupled appears to be jaundice and disease of the liver. The most remarkable case which Dr. Elliotson gives is narrated by Mr. Pearson. Mrs. W., aged seventy-nine, was labouring on the 28th of March, 1829, under a severe attack of gall-stones, a disorder to which she had been occasionally subject for some years. She complained also of a dull pain in the region of the liver, that had been felt for some months in a slighter degree. She had suffered frequent pain in the head, and giddiness, which latter came in a paroxysm daily about five o'clock, before dinner. She also suffered in an almost insupportable degree from prurigo pudendi. Her constitution was gouty, but on the whole pretty good till within the last two years. She had always led a very sedentary life. For some months the fecal evacuations had been scanty, and almost free from fecal odour. The urine was pale, and in proper quantity. She recovered from the attack; but about a month afterwards observed in her evacuations a thin, concreted, fatty-looking substance, and the stools were, as above described, without the least appearance of bile. She observed, that oil also passed the bowels in a liquid state, and quickly concreted; and that a similar oil passed with the *urine*, and floated upon its surface; but, when removed, concreted into the same appearance as the fat from the intestines. The quantity of oil which escaped from the bowels was such, as to oblige her constantly to wear a napkin. The bowels were generally irregular, and each evacuation was usually preceded by some pain. Without any other particular symptom the patient became more and more emaciated, and died on the 29th of October.

The quantity of fat and oil from the bowels averaged about an ounce and a half daily when they were relaxed, and from the bladder about the third of an ounce. The oil and fat from both patients readily inflamed in the fire; and, when mixed with alkali, formed a good soap. In this case no post-mortem examination was allowed. The appearance of the oil in the urine would lead to the impression, that, in case, a general failure of the powers of assimilation had en place.

r. Elliotson, however, in another case where oily fat found (the other abdominal bowels being sound) eatic duct and the larger lateral branches crammed calculi. So that, upon the whole, connected the pancreas is with the liver, the pathological tion indicated by Dr. Bright remains of considerable est.

Calculous concretions. De Graaf found seven or eight calculi, of the size of small peas, in the pancreas of a man who had been long liable to vomiting and diarrhœa, and died, gradually exhausted, at the age of thirty. Portal found the pancreas much enlarged, and containing twelve calculi, some of them the size of nuts, in a man who died of disease of the aorta. In a case mentioned by Dr. Baillie, calculi from the pancreas were about the size of the kernel of a hazel-nut, with a very irregular surface, and were found to be composed of carbonate of lime.

SECTION X.

Spleen.

1. *Laceration of the spleen* may be produced by a blow upon the left hypochondrium. The symptoms are the same with those of rupture of the liver. Death takes place either from hemorrhage or from peritoneal inflammation.

2. *Hypertrophy of the spleen.* Simple enlargement of the spleen occurs chiefly as the result of intermittent and remittent fevers. It is also said to occur from other causes; as in young women in connection with suppression of the menses, and in persons more advanced in life from the suppression of long-continued hemorrhoïdal discharge. The spleen in this state sometimes reaches the weight of eleven to twelve pounds. The texture of the gland appears natural, or even firmer than usual. At page 292 a case is referred to of rapid diminution of enlarged spleen through hemorrhage into the stomach.

3. *Inflammation* of the substance of the spleen.

A gentleman aged fifty-two, who had enjoyed previously very good health, was affected, in January 1821, with cough and slight feverishness like a common cold. After a short confinement the cough disappeared, and he felt otherwise much better; but after some time he was confined again, though without any defined complaint except weakness. When closely questioned, he sometimes mentioned an undefined uneasiness across the epigastric region, but it was slight and transient: his appetite was variable and capricious, but upon the whole not bad, and he had no dyspeptic symptom; his bowels were rather slow, but easily kept open; his breathing was natural; and every other function was in a healthy state, except that his pulse continued a little frequent, and that he was becoming progressively more weak and emaciated. In this manner the complaint went on during the remainder of the winter: in the beginning of summer he went to the country, where he made no improvement.

He was now greatly reduced in flesh and strength: his pulse was from 96 to 100, and weak; his nights were generally good, but sometimes feverish; his appetite was bad, but he still took a good deal of nourishment, and never complained of his stomach; there was no cough and no pain; the urinary secretion and bowels were natural; but the debility and emaciation continued to increase progressively. On the 2d of July he was seized with diarrhœa, and died on the 5th. Before the attack of diarrhœa, there had been little change table hemorrhoids, or a gonorrhœa, occasionally lead to sympathetic bubo in the groin; the course of which is the same as that of inflammation of the lymphatic glands from direct irritation.

e. The lymphatic system is liable to become affected in some of the cases in which poisons are supposed to be introduced into the system. The principal varieties of these cases are wounds received in dissection, and ulcers following venereal infection. The consequences of inoculation with the fluids of a decomposing body are referable to two classes; they generally do not occur in combination, but one or other train of symptoms separately manifests itself. In the more rapid and dangerous of the two seizures, the lymphatic system is not involved. The patient in a few hours after inoculation is seized with pain (generally unattended with swelling) of the part, with shivering, and fever. The fever has a tendency to assume a typhoïd character: it is attended in two or three days with swelling of the cellular membrane of the axilla and beneath the pectoral muscle, or upon the side and back. When these swellings contain a sensible quantity of fluid, or are tense, the patient experiences the greatest relief upon their being freely opened. Cases of this class often terminate fatally in from two days to a fortnight after the first seizure: to their production a wound is not necessary: it is sufficient, where the habit is vitiated, that the fluids of the decomposing body should have come in contact with the skin of the patient. The cause of such an attack, therefore, occasionally escapes early detection: the patient complains of no punctured wound or local inflammation. Nevertheless, where there has been no wound, it sometimes happens that two or three vesicles form upon the infected skin, unattended indeed with inflammation, yet sufficient to direct the surgeon to the true nature of the malady. The tissue on which the poison exerts its powers of irritation in this class of cases appears to be the cellular: the symptoms produced are those of diffused cellular inflammation. Some account of the disorder has been already given at page 65. In the mildest form of cellular inflammation, the attack is confined to the immediate neighbourhood of the part inoculated: a finger thus is alone swollen, red, and painful. The complaint in this subdued form generally produces anchylosis of the nearest joint, and frequently sloughing of the tendons passing over it.

It is in the more trivial and common kind of disorder, following wounds received in dissection, that the lymphatic system is involved. The wound, after two, three, or four days, inflames: if it was a puncture, a circular pustule forms; if an incision, the whole length opens and suppurates. At the same time the lymphatics of the limb become inflamed and tender, and their course is marked by red lines upon the skin. Often likewise a lymphatic gland inflames. After a few days, under ordinary treatment, these symptoms subside: during their progress, there is little or no constitutional disturbance.

These two effects of poisoned wounds or surfaces are commonly produced by different states of the decomposing body. The first and more serious attack generally follows a poisoned wound from a body dead only from twelve to forty-eight hours, and in which some serous surface has been found in a state of acute inflammation. The slower attack commonly proceeds from inoculation from part of a body advanced in putrefaction. The first therefore mostly occurs to medical men in practice accidentally examining a body after death: the second is more common among medical students. It has happened, however, that two persons have been affected, each with the different seizure, from examining the same body.

After inoculation with the venereal poison, the lymphatic system frequently becomes affected. The process appears to be the following. The poison resting upon the skin is imbibed by it, or becomes incorporated with it. The part of the skin loaded with the poison is next carried away by the absorbents, and then an ulcer is produced. The lymphatics which conveyed away the poisoned particles, irritated through this cause, become inflamed: they may be felt as hard and tender lines below the skin; and the gland to which they lead swells, is painful, and may become the centre of a suppuration. If the disease is allowed to pursue its course unchecked by proper medicine, the skin covering the inflamed gland ulcerates; but the escape of the matter previously confined does not relieve the part: on the contrary, the ulcer spreads in breadth and depth; the surface foul, greenish, or grey, with a tint of deep red; the surrounding skin raised, thickened, dark red; the edge irregularly eaten away, angry, painful.

The lymphatic glands are liable to become simply enlarged and hard, without much vascularity, and with a degree of hardness approaching to the character of cartilage. The disease seems to be a primitive enlargement of the glands, not the result of irritation propagated to them from other diseased textures. Dr. Hodgkin, in the 17th volume of the Medico-Chirurgical Transactions, has given some good instances of this affection; the nature of which, however, is by no means satisfactorily made out.

II. Tuberculous affections of the absorbents manifest themselves in the glands alone, but the glands of both systems; that is to say, in the lacteal as well as in the lymphatic, and in the deep-seated as well as in the superficial glands. Practically, however, the latter division may be used to establish two classes of cases.

a. In superficial tuberculous affections of the absorbent glands, the glands slowly enlarge without pain; their texture becomes infiltrated with tuberculous matter, which is deposited either in their serous canals or their cellular tissue, or in both. After existing for a certain length of time in a solid state, the enlarged glands soften, and matter forms within and around them, the process being attended with chronic inflammation, slight tenderness and redness of the skin over the glands gradually supervening. The steps on the spontaneous process of restoration are the separation and elimination of the tuberculous matter with the suppuration, then healthy granulation and cicatrization. The points deserving of attention in this course of disordered actions are the following: —

1. The common seat of scrofulous enlargement of the lymphatic glands is the neck, about the parotid and supra-

clavicular regions. The disease is generally at once recognizable by the number of glands simultaneously affected.

b. When the disease has advanced to the suppurative stage, the part affected presents a well-marked character. There are one or more ulcerated openings through the skin, which is red, soft, and undermined: the discharge is thin and serous, with flakes of albuminous or tuberculous substance in it. The ulcerated surface seen through the openings of the skin is of a light pink, or consists of pale half-organized granulations. The skin, being extensively undermined, ulcerates to a great extent when the healing process is about to begin; from this cause are produced the ragged and unsightly seams and scars of the neck of scrofulous persons. When it is certain that a chain of enlarged glands are filled with tuberculous deposit, it becomes a question whether they should not be removed by an operation. The wounds thus made heal very kindly; and the patient is saved the slow and tedious suppurative process, and the disfigurement. Iodine is occasionally of great use in dispersing clustered glandular swellings of the neck.

c. Scrofulous enlargements of the internal glands,—of the mesenteric for instance, or the bronchial,—rarely lead to suppuration: but their effects are not the less fatal. In the former case nutrition is obstructed, the belly is large and hard, the patient wastes and sinks; tuberculous disease commonly developing itself at the same time in other parts, in the intestinal glands, or in the lungs.

In the latter case, the enlarged glands pressing upon the windpipe have produced in children difficulty of breathing with convulsions, that have proved fatal. Tuberculous disease of the bronchial glands often coexists with tuberculous disease of the lungs.

III. The malignant diseases in which the lymphatic glands partake are carcinoma, medullary sarcoma, melanoma, and mammary sarcoma.

a. In the neighbourhood of a scirrhous breast, the lymphatic glands commonly become carcinomatous. This circumstance does not necessarily render the removal of the breast unadvisable. The subject will be discussed in connection with disease of the mamma.

b. Medullary sarcoma is liable to originate in the lymphatic glands; as well as to follow, secondarily, the same disease in a neighbouring organ.

Anne Cook, aged sixteen, admitted into the Middlesex Hospital October 19, 1835, three years ago received a violent blow with a bar of iron on the inner and upper part of the thigh. The part was bruised and black and painful for two or three days: it was swelled, with a sense of crepitation, from blood effused into the cellular membrane. About two months afterwards there formed, three inches below the groin, a lump of the size of a walnut, which was not movable: there was no pain in it for the first three months, although it grew fast, and was uneasy on pressure. By this time having attained the size of a large orange, the tumour ceased to grow. She now at times felt a shooting pain in it, which would last for an hour to an hour and a half. If she knelt, it gave her pain. For the last seven months the swelling has been enlarging: and there has been more pain, which is increased by pressure on the tumour, the inner surface of which is tender, with a slight blush upon the skin. The saphena vein is full and large at this part.

This tumour I removed on the 23d of October. It formed a flattened spherical mass about six inches in its thickest diameter, which externally rested against the sheath of the femoral vessels, and internally extended underneath the adductor longus and gracilis. The tumour was a mass of brain-like and grumous matter, contained in a strong membranous cyst, with irregular membranous processes extending through it. It appeared to be medullary sarcoma of an inguinal gland. The case went on at first very favourably; and the wound for some time had all but healed, when, in the beginning of January, a diffused hardness began to show itself round parts of the cicatrix, which threatens a return of the disease.

c. Melanoma, in conjunction with medullary sarcoma of the inguinal glands, is exemplified in the case described at pages 236 and 364.

d. Mammary sarcoma. A girl, aged thirteen, was admitted, in 1833, into the Middlesex Hospital, under my care, with a large nodular and deep-seated tumour of the left groin, which had been slowly forming for many months. The skin covering part of it had a bluish tinge: part was hard, part elastic: the elastic part being punctured, gave vent to some matter which was thought to be brain-like. Partial inflammation and suppuration followed; but the rest of the tumour enlarged, the skin ulcerated at two or three of the most prominent parts, and a thin discharge took place from the openings. This process was attended with great pain, the child's strength gave way, and it died in three or four months after its admission. The disease had been confined to the groin: it penetrated between the adductor muscles, the fibres of which were pale and tensely stretched over the nodular mass; the latter, when cut through, was of a light greyish brown colour and firm, consisting of several tumours adhering together, with membrane between them. They were judged to be diseased lymphatic glands: their appearance resembled the texture of udder, and agreed with Mr. Abernethy's description of mammary sarcoma.

CHAPTER XI.

ORGANS OF THE CIRCULATION.

THE pathology of the organs of the circulation may be described under the following heads:—the capillaries, the veins, the arteries, the heart, the blood.

SECTION I.

The Capillaries.

The coats of the capillaries are so fine, that the vessels themselves are not visible. But their existence is demonstrable in transparent parts of living animals through the motion of the particles of the blood: the latter (when the part is examined in a microscope) are seen to move in unchanging currents, that branch from larger divergent currents (which are contained in minute arteries), and terminate in larger convergent currents (which are contained in minute veins). The intermediate channels, which are of one dimension, and cannot much exceed in diameter a particle of the blood, and have reciprocally frequent reticular anastomoses, form the capillary system.

In health, the capillaries perform two offices at the least; they regulate the quantity of blood distributed in each part, and they give passage through their coats to the materials of growth and secretion. We may suppose there is an average tone for the capillary vessels of the body, which they habitually maintain: sometimes, however, that tone is heightened, as in sudden paleness from mental emotion, when the cutaneous capillaries of the face contract and admit less blood; sometimes, on the other hand, the tone is lowered, as in blushing, when the facial capillaries are relaxed, so as to yield a larger passage to the blood. In health again slowly; and where it is stagnant, or nearly motionless, is changed in quality, the distinction of a transparent liquid and particles suspended in it being lost. These appearances, which have been observed by many, I have repeatedly produced by irritating the membrane of the foot of frogs under the microscope.

II. The morbid products, which I shall alone notice on the present occasion as liable to be abnormally separated from the blood in the capillaries, are serum, lymph, pus. Capillary hemorrhage has been already spoken of on more than one occasion. The formation of tuberculous matter will be adverted to in connection with the pathology of the lungs, and that of the malignant tumours with the diseases of the breast and testis.

1. *a.* The most frequent cause of effusion of serum is retardation of the progress of the blood in the veins. The effect in this instance is perhaps entirely of a mechanical nature. The capillaries being gorged, the thinnest part of the blood transudes through their coats. When the axillary vein is compressed by enlarged and indurated lymphatic glands, serum thus escapes into the cellular membrane, or the limb becomes œdematous. When the upper vena cava is obliterated by inflammation, or obstructed by the pressure of a tumour, the face, throat, and arms, are loaded with anasarca. When the inferior cava is obstructed, the legs become anasarcous. When the cavity of the femoral vein is obliterated by inflammation, the same result takes place. When the hepatic circulation is obstructed by thickening of Glisson's capsule, abdominal dropsy, or ascites, follows. When the inferior cava is compressed near the diaphragm, by induration of the pancreas or adjacent lymphatic glands, dropsy with anasarca of the legs ensues. When there is valvular disease of the heart, allowing the stroke of the left ventricle to tell backwards and impede the propulsion of blood through the lungs, and even its passage through the right side of the heart, the lungs and the whole body are liable to become infiltrated with serum. Finally, the pressure of ovarian tumours, or of dropsy, on the iliac veins will render the legs œdematous.

b. It is probable there may be a condition of the blood — such as, for instance, extreme attenuation from repeated hemorrhage — which may dispose it to part with serum readily, and so to give rise to œdema. A thin blood and a weak heart are capable of occasioning anasarca and dropsy.

c. Chronic inflammation of the kidney, impeding the secretion of urine, may be productive of anasarca. This is one of the causes of the anasarca which follows scarlatina. Dr. Bright discovered and described the influence of this cause in determining effusion in persons who have lived intemperately; and showed its connection with albumen in the urine.

d. General effusion of serum partakes sometimes of an inflammatory character. In young and not otherwise unhealthy persons, œdema of the legs, of the arms, and face, with ascites, will sometimes supervene after exposure to cold, being attended with slight tenderness of the swollen parts, and often with albuminous urine.

e. Serous effusion is a constant attendant of ordinary inflammation, exuding equally into the interstitial cellular membrane, into the cellular tissue of organs, upon serous and mucous surfaces, and upon the skin. Its source in these instances is again probably mechanical, and attributable to the obstruction of blood in the inflamed capillaries. The softening common to all fleshy textures at the outset of acute inflammation is in part at least produced by their infiltration with serum.

2. *Lymph,* in its chemical composition, resembles coagulated albumen or the fibrin of the blood. It is probably the latter element exuding in a liquid state, and then coagulating. The colourless part or size, which in two or three minutes separates and floats upon the surface of liquid inflamed blood, Hewson has shown to be *fibrin unusually attenuated:* but if there exists in inflammatory blood a portion of unusually attenuated fibrin, — and if that fibrin can be shown to have a disposition to separate from the rest of the blood, — and if its tenuity would render its mechanical escape from the containing vessels the more facile, — and if from vessels in inflamed parts a liquid fibrin is

found to escape,—we seem to be already in possession of all the elements of this phenomenon.

3. *Pus* is an opaque, straw-coloured liquid, of the specific gravity 1050, which does not spontaneously coagulate. The colour is owing to a prodigious number of minute particles. Upon comparing them with the particles of the blood (streaks of both fluids being drawn side by side upon a glass micrometer, and examined in a microscope by Carey, with achromatic object-glasses by Dollond), I found the shape of the particles of each to correspond accurately. The particles of the blood were discovered by Dr. Young to be flattened discs, resembling pieces of money, but having rounded edges, and a shallow central depression on their flat surfaces. The particles in pus are precisely of the same shape. They are, however, considerably larger than the blood particles; the latter being $\frac{1}{5000}$ of an inch, while the particles in pus are $\frac{1}{3000}$ only in diameter. If we may rely upon the observations of M. Gendrin, the production of pus bears a considerable analogy to the separation of serum and of lymph as above described. He states that he has seen in the capillaries of the frog's foot, when in a state of inflammation, the blood particles put on the appearance of particles of pus, and afterwards exsude as pus upon a wounded surface. The reader will desire to see the words of this remarkable statement; they occur at the close of an elaborate account of the separation of a slough following a burn on a frog's foot, of which the following is a translation.

"If we cauterize a point of a frog's foot under the microscope, by the solar rays, and then concentrate a less heat in the part, but sufficient to provoke inflammation in it, at the expiration of six to eight minutes, numerous distended capillaries are seen about the eschar: the circulation is as yet accelerated in the largest of these vessels, but in the lesser ones it is slower, and entirely arrested in the smallest, which are full of motionless red blood, in which globules are not distinguishable: twenty-five to thirty minutes later, the circulation is slower in the principal capillaries, in which alone it is now going on. At two lines from the eschar the capillaries are very much dilated, and display a rapid circulation of blood rich in globules.

"On the sixth day the little solution of continuity is covered with a layer of yellowish grey fluid, which appears to be without globules, but in the middle of which are mixed little striæ of a liquid substance, containing tolerably large globules; the fluid of which these little striæ consist does not appear to differ from that which is slowly moving in the capillaries. These striæ are evidently, indeed, continuations of the capillaries, for the movement of the fluid in the capillaries is seen to be continued with, or progressive upon their fluid.

"The process of cicatrization is completed towards the tenth day. The circulation is then re-established up to the edge of the wound; it is still slow, but the vessels have returned to their original size. The striæ are very numerous, but they are no longer formed of a yellowish grey and evidently purulent fluid, but of a pinkish yellow, globulous, half-coagulated substance. The progress of globules may be followed from the adjacent capillaries into the completing cicatrix: on entering its bounds they move more slowly, become paler, but move in determinate tracks. Their progress is very slow; small red striæ without globules or motion are likewise to be seen. When the cicatrization is perfected, the capillary circulation is established in the cicatrix itself; it is still, however, at first slow on the vessels of the cicatrix, and some globules may be observed to lose their colour in traversing it."

The complement of this interesting statement is the following passage.

"Si l'on passe un séton au travers de la pate d'une grenouille, aussitôt que la suppuration est établie, on peut aisément en suivre les progrès. En introduisant une lancette sous le bord de la plaie, en soulève une lamelle excessivement fine, dans laquelle on peut voir s'opérer la circulation assez lente de pus vers la plaie. Ainsi le sang relentit sa marche en approchant de l'aréole, et avance d'autant plus lentement, qu'il se decolore progressivement davantage; il vient sortir de la plaie sous la forme de pus."

The observations which I have quoted from M. Gendrin, when taken in connection with the facts previously stated, the blood in inflamed veins deserves to be associated. The first is, the formation of fibrinous excrescences in the lining membrane of the heart in endocarditis. There is little doubt that the contact of the inflamed serous surface, in the latter as well as in the former case, immediately determines more or less coagulation of the blood flowing over it. The second phenomenon, which seems to have some alliance with the facts before us, is the immobility of the blood in the capillaries in the centre of an inflammation. May not this circumstance be attributed to an influence exerted by the irritated capillaries corresponding in its nature to that which causes the coagulation of the blood in an inflamed vein?

The disease termed phlegmasia dolens, in its mild form, is subacute phlebitis.

I have in a considerable number of cases applied caustic or caustic paste over the trunks of the subcutaneous veins of the leg for varix. In some few instances, on the healing of the ulcer left by the separation of the eschar, no effect on the vein has been observable; but in much the greater proportion the vein has been found firm and hard, and its cavity obliterated at the part where the issue has been made. I have little doubt, that, in the successful cases, the irritation upon the vein has caused local subacute inflammation, as a consequence of which the blood has coagulated in its cavity, and plugged it. The vein is often tender, during several days, for the extent of three or four inches above the place at which the caustic is applied. The obstructed part does not exceed more than half an inch to an inch in length. I have never known acute phlebitis supervene in employing this practice. In one case occurring in a young woman, an inexperienced dresser made a circular eschar two inches in circumference, and deep in proportion, over the saphenic vein immediately below the knee: it opened the saphena, and within six hours there was violent venous hemorrhage: this of course stopped on pressure being applied. During the next few days there was tenderness of the saphena extending half the length of the thigh, over which leeches were applied once: the case did perfectly well, no other unfavourable symptom occurring. The best material to form a caustic in this instance is a paste made with soft-soap and quick-lime.

The veins commonly attacked with subacute inflammation are those of the lower extremities.

A patient, in the Middlesex Hospital for another complaint, complained of pain of the inside of the leg: the skin at that part was mottled with red; the redness followed the course of the trunk and branches of the saphena major vein, which felt thickened and firm. There was little constitutional disturbance, and the redness and uneasiness of the leg subsided.

A lad, aged nineteen, was attended by Dr. Watson and myself for fever with suppurations in many parts, under which he sank after upwards of two months' illness. A few days before he died, the left leg became œdematous. On examining the body, the left femoral vein was found plugged up with coagulum throughout its whole extent: the coagulum was firm, and of a reddish brown at the upper part of the vessel, looser and darker towards the ham.

I attended, with Mr. Andrews of Stanmore, an elderly woman, who had been confined to her bed for some time with pain and tenderness at the lower part of the belly, and slight symptomatic fever: the belly had been extremely tense from distension of the bowels with wind. I have no doubt that the disease was subacute inflammation of the uterine veins. At the time that I saw the patient, the abdominal pain was less; but pain and œdema of the right thigh and leg had supervened: the pain lay in the direction of the femoral vein, which was hard, and tender on pressure.

b. Acute inflammation of veins has a much more serious character than the disorder last described. The greater part of the vein or veins attacked with acute phlebitis is indeed always found in the state just mentioned; but at other parts inflammatory products are present, lymph coating the inflamed lining membrane, and pus, either diffused or in a chamber circumscribed by lymph and coagulated blood. The attendant fever is of the typhoïd character, and the complaint is probably always fatal. Acute phlebitis is liable to occur after compound fractures and dislocations, after amputations, in puerperal fever commencing in the uterine veins, in malignant disease of the uterus, and as a consequence of injuries of single venous trunks — for example, after venesection, or tying veins that are varicose.

The most remarkable feature of this destructive complaint is its connection with what may be termed the suppurative diathesis. Where suppurative inflammation exists in a vein, matter is generally formed in several other organs, — in the muscles, in the joints, in the serous cavities, in the different viscera,—and with all the appearance of having been spontaneously and easily eliminated from the vessels, the customary vascularity and thickening attending ordinary suppurative inflammation not being present.

This subject, although not altogether overlooked by former pathologists (Dr. John Clarke in 1793, and Mr. Wilson in 1805, having noticed and described inflammation of the uterine veins), yet has been but recently developed in all its bearings. Dr. D. Davis, in 1823, pointed out the dependence of phlegmasia dolens on phlebitis; and, in 1826, M. Dance attributed the typhoïd form of puerperal fever to this cause, and pointed out the connection of venous inflammation with suppuration in other parts. The subject has been since investigated and extended by Dr. Robert Lee and Mr. Arnott in this country, and by M. Tonnellé and others on the Continent.

Of the attempts to explain the relation between acute phlebitis and the deposition and formation of matter in other parts, the most mechanical conjecture is, that the matter deposited in other parts is pus that has been first formed in the inflamed veins, and has thence been carried in the circulation to new places. The most original notion which has occurred to reasoners upon this question is, that the mixture of pus with the blood causes the blood as it circulates to form more pus; as the absorption of venereal virus causes a part to form more of the same poison. Gendrin's remarkable although inconclusive experiments, showing the rapid conversion of a clot into pus, favour this idea. The most cautious view may be to suppose, that, when one part

IV. *Ossific degeneration.* The texture of the large venous trunks sometimes, but rarely, is the seat of phosphate of lime deposit.

V. *Malignant growths.* It is not uncommon to see medullary sarcoma extending into the interior of the venous trunks.

SECTION III.

The Arteries.

The pathology of the arteries may be treated of under the following heads:—reparation; the hemorrhagic tendency; hypertrophy; inflammation; degeneration of tissue; morbid growths.

I. *Reparation.* A wound of an artery is as capable of uniting by adhesion, as a wound of a vein or of the integuments. That adhesion seldom takes place of the sides of a wounded artery is owing to the force with which the blood is driven along its channel, a force sufficient to overcome any common pressure. The temporal is nearly the only artery which admits of being kept so compressed as completely to stop the circulation through it. Situated between the integuments and a bony surface, the flow of blood through the temporal may easily be prevented by a bandage: in this manner the vessel is usually treated after it has been opened in arteriotomy. In less than twenty-four hours after being opened, the vessel in this case is found to have healed; and if the bandage is removed, the blood again passes along the vessel as before. It is necessary, however, to keep the bandage applied for a longer period, in order that the cicatrix of the vessel may acquire firmness; otherwise it gradually yields to the force of the blood, and an aneurism is produced.

In ordinary wounds of arteries, direct reparation is not looked for; but a circuitous kind of restoration takes place, which combines two elements — the obliteration of the wounded artery, and the enlargement of collateral channels.

A wound of an artery may be either a puncture, or complete division: unless the artery is superficial, and lies upon artery, and again permitting its action, and this frequently, the impulse given to the blood thus advantageously failed to remove the obstruction to its issue. This was about an hour after the accident, and the remains of the arm were removed without delay."—*Guthrie.*

When a large artery is divided by a clean incision, or opened laterally, the hemorrhage, unless artificially stopped, persists till the patient faints and death ensues.

The temporary arrest of hemorrhage may be effected mechanically, as when pressure is applied in various ways, by the hand, the tourniquet, and the like. Its permanent suppression must turn upon pathological principles, and depend upon the resources of the part called into operation by proper methods. The means which we possess for permanently arresting hemorrhage are, the ligature, torsion, pressure, and astringent applications.

When a ligature is tied tightly upon an artery, the serous and fibrous coats are cut through, owing to their brittleness, and retract: the knot thus encloses the cellular coat of the vessel alone; but the violence done to the artery irritates the serous coat of the artery, throwing it into a state approaching towards inflammation. Under this influence, the blood in the part of the vessel near the ligature coagulates, and, adhering to the inner membrane, forms a plug from half an inch to an inch in length. The ring of membrane enclosed in the ligature now sloughs, and separates before or with the ligature; which comes away, from a small artery in about eight days, from a large artery in about fifteen. When the ring of membrane has separated, the compressed and thickened end of the cellular coat cicatrizes; the cicatrix is guarded against the impulse of the blood by the adhering clot behind it.

Torsion of an artery is performed by drawing out the divided end with forceps, applying a second pair of forceps half an inch or more from the first to fix the vessel, and twisting the portion so drawn from the wound by the first. The first effect of torsion is mechanical, the bruised and twisted vessel has not elasticity enough to untwist. The next effect is vital, the irritated inner membrane causes the

The pathological principles, on which the treatment of hemorrhage is founded, may be further brought out by considering hemorrhages as of three classes: the first, those which follow amputations; the second, those which attend wounds without loss of limb; the third, inward bleedings.

After an amputation, all the arteries that bleed or can be distinguished should be tied with ligatures proportionate to their size. If the ligatures are laid straight in the wound, they do not interfere with the adhesive process; but, on the contrary, serve as convenient drains for any partial collections of matter that may form within the wound.

Secondary hemorrhage following an amputation is liable to occur at two periods. The first is within the first six or eight hours. The vessels, from which it proceeds, are such as, having contracted and temporarily closed during the depression and chill of the operation, had not been secured; such vessels, on the patient recovering heart and warmth, occasionally become relaxed and allow the escape of the blood. If the hemorrhage is considerable, and flows through the dressings, the wound must be opened and the vessels tied. The time for the second kind of hemorrhage ranges from the seventh or eighth day to the tenth week: it is produced by ulceration of some large artery divided in the operation, which had been temporarily secured by ligature. This accident can hardly happen but in a stump: in that case the last resource is to cut down upon and tie the trunk of the artery at a little distance from the end of the stump. In a patient who had undergone amputation of the leg above the knee, and in whom the wound healed favourably all but a sinus which extended to some depth along the side of the bone, violent hemorrhage supervened at the *tenth* week, for which I tied the common femoral artery: the patient did well, but partial sloughing of the stump followed. When arterial hemorrhage of this kind has taken place from a stump, it sometimes happens that without any means being used, it does not recur.

Hemorrhages from wounds casually inflicted, or in which the part supplied by the punctured or divided vessel is not amputated, present more complicated features. It often happens in such wounds, that there is at the time furious bleeding, when the patient faints, and the hemorrhage stops. If the bleeding has been arterial, and in such quantity and direction as to make its source from a large artery probable, the wound should be enlarged if necessary, the injured artery exposed, and both ends tied. It is not sufficient to tie one end only: hemorrhage may return from the distal end. Nor is it safe to wait for a return of hemorrhage, giving the patient a chance of its not returning. The common period in such cases for the secondary bleeding is a week or eight days from the first: the parts at that time are probably inflamed and thickened, in a state therefore in which it is hardly possible to expose the extremity of the vessel that bleeds. The only resource in that case is to secure one extremity of the vessel by tying the trunk nearer the heart, leaving the distal end unsecured; and what is worse, tying a vessel during the presence of an inflammatory and suppu-tive diathesis, when the operation is not unlikely to be fol-ved by inflammation of remote serous membranes and purulent deposits in other parts. In a patient in whom I tied the common carotid for hemorrhage ensuing at eight days after division of the external carotid, suppuration took place upon the surface of the brain. The recurrence of such hemorrhage at a week's interval from the wound, in a case of compound fracture of the leg, may on the same principle necessitate the amputation of the limb, and that at an unfavourable time; which might have been prevented by enlarging the original wound, and tying both ends of the artery on the day of the injury.

When arterial hemorrhage proceeds from sloughing or ulceration of a part, there is no resource but to tie the branch from which it proceeds, or, if that is inaccessible or uncertain, the neighbouring trunk. In a case of repeated arterial hemorrhage from venereal sloughing of one side of the fauces and pharynx, I tied the common carotid, and the patient recovered.

In the application of ligatures upon arteries, it is of the last moment not to place the thread immediately beyond the origin of a branch; inasmuch as the flow of the blood through that branch will interfere with the formation of the clot in the vessel behind the ligature, on which the security of the cicatrix of the vessel depends.

Hemorrhages which flow from rupture of inward vessels (in the lungs for instance) require other principles for their suppression. These are, rest, which keeps down the action of the heart, the promotion of (or the not interfering with) the faintness that supervenes, for that faintness disposes the blood to coagulate in and around the ruptured vessel: the use of inward styptics, such as Ruspini's styptic, or the subacetate of lead, or the acetate of zinc, which are thought to have a tendency when taken by the stomach into the system to cause the opened vessels to contract.

When arterial hemorrhage is stopped by the application of a ligature on an artery, the following changes additionally take place. The ends of the artery, which was divided by the ligature, are united by a strong cord of coagulated lymph; the cord of course is solid, not a tube: the ends which it joins, instead of communicating through it, become, in the lapse of a few months, shrunken and impervious for some distance from the place where the ligature was applied. The arterial tissue wastes by absorption on each side of the primary point of obliteration.

As if nature anticipated the occasional obliteration of arterial trunks, there is a provision for supplying their place. This is founded on the same principle which determines their closure when divided; namely, on their irritability: through this endowment on the one hand a torn artery may contract: on the other, the collateral arteries may become relaxed and allow the blood to flow in fuller streams through them to the distal part of the limb. It is not indeed their relaxation alone which accomplishes this effect: the effect begins in relaxation, but it is completed by growth. The collateral arteries, which at first *give* by relaxation, afterwards consentaneously grow to a larger dimension.

The hemorrhagic tendency. There are persons who are in danger of bleeding to death from the slightest wound; and cases are on record, in which the amputation of a limb, the removal of a tumour from the rectum, the extraction of a

tooth, have been fatal: the minute vessels in such cases, instead of closing, continue open. There are, however, degrees of this tendency. A child to which I was called for continued bleeding from the gum and alveolar process, that had persisted for several days, recovered through the continued or frequent application of ice to the mouth and face. On what does the hemorrhagic tendency depend? It evi-
ntly results from the indisposition of the small vessels to
ntract; they want or have less than usual of their proper
tability.

III. *Hypertrophy.* During utero-gestation the arteries of
womb become more capacious, and longer and therefore
n ◦ The object of their increased capacity is to allow
ɔuantity of blood to flow into the growing part:
ter length and tortuousness is probably in part acci-
d may be a collateral and even useless result of the
s which dilates them. That process I believe to begin
ir *relaxation.* Their tonic resistance I suppose to be
below its former standard, and below the resistance
coats of other arteries in their vicinity; as a consequence, the impulse of the heart drives proportionably more blood into *them:* they yield, and are fuller and larger than before; but the yielding of a tube from lowered tone (as I have experimentally shown in my Treatise on Physiology) necessarily takes place in its length as well as breadth: the artery yielding to the blood becomes longer, and therefore tortuous, as well as larger. The dilatation thus beginning is supported by increased growth of the part; which as it grows continues still relaxed in tone, and becomes therefore more and more elongated and tortuous. The increased growth in this instance is a *physiological* hypertrophy, and comparable to the enlargement of the bones and muscles of a blacksmith's arm.

A similar hypertrophy occurs as a pathological phenomenon in more than one instance.

Aneurismal varix occurs when an artery is punctured through a vein; the outer wound of the vein closing, a communication is left between the arterial channel and the venous. In this case the artery above the communication becomes more capacious, and at the same time slightly tortuous: it becomes first relaxed, then enlarged by growth, or hypertrophied. The effect may be viewed as an effort of nature to allow a double quantity of blood into the limb, to make up for the loss of that which directly returns to the heart by the vein.

Another instance of arterial hypertrophy occurs in the affection described by Mr. John Bell under the name of aneurism by anastomosis. A patient labouring under this disease died from other causes, under my care, in the Middlesex Hospital. He had a raised pulsatory tumour on one side of the head, for the cure of which Mr. Babington had tied the temporal, and Mr. Wardrop the common carotid artery, with temporary benefit; but the pulsation of the tumour, with disposition to gradual increase, had returned. On examining the part, the arteries having been injected with wax, the middle temporal artery was found to enlarge and become more and more tortuous in its ascent; opposite to the tip of the ear it gave off a branch of three times its own diameter, which lay coiled upon itself with a similarly hypertrophied vein: together they had constituted the tumour. The surrounding cellular membrane was slightly thickened, but the skin did not adhere with inseparable firmness to the tortuous vessels; and the bone below, although thinned by absorption, was healthy, and covered with a healthy periosteum.

In the fifteenth volume of the Medico-Chirurgical Transactions, Sir Benjamin Brodie describes a tumour of the same nature (but which, as is more commonly the case, was formed of *several* tortuous vessels), that had originated on the forehead of a child four years of age, in consequence of a blow. At first it was not larger than a pea, and for many years it remained stationary in size, although it pulsated. Twelve years afterwards pressure was tried, which gave pain, and was followed on its discontinuance by the increase of the tumour. Four years afterwards, at four different times, Sir Astley Cooper tied each of four arteries which supplied the tumour, and each time with temporary benefit. But the tumour again grew larger, and the pain returned with redoubled violence, attended with a constant sense of weight over the eyes, and excessive depression of spirits. Three years afterwards the tumour had become bigger than a large double-walnut. The skin covering it was thin; and on some occasions, as in coughing, when the vessels were unusually distended, it appeared as if on the point of bursting. When the scalp was shaved, large and tortuous arteries were to be seen, even from a considerable distance, passing into the basis of the tumour in every direction, from each temple, from the orbit of the right eye, and even the crown of the head from the occiput. The tumour was successfully removed by means of a ligature tied round two steel needles introduced at right angles to each other below the tumour, producing strangulation; which, however, being found not to have been quite perfect, was completed three days afterwards by arming one of the needles with a double ligature, and tying it round each half of the tumour.

It is evident that tumours of this description are instances of arterial combined with venous hypertrophy; the elements of the change the same, only misplaced, with those by which, in the healthy state of the economy, the uterine arteries enlarge in pregnancy.

In cases in which a pulsating tumour of this description has been so situated (either spread over the side of the face and ear, or growing on the orbit) as to preclude the ligature or excision, the main artery of the part has been tied with success; and although the chances must always be against its efficiency, the operation is certainly to be recommended in this class of cases.

The tumour called vascular nævi, I am disposed to view as hypertrophied capillary tissue, rather than as erectile or hypertrophied venous texture, which is perhaps the commoner idea entertained of this structure. The vivacity with which arterial blood is poured out from the entire cut surface when they are divided, the absence of enlarged venous trunks about them, and what I have been able to make out of their texture through specimens very imperfectly injected, lead me to this conclusion. The subject has been already noticed at page 235.

IV. *Inflammation* of the arteries is considerably less frequent than inflammation of the veins; but it presents the same varieties.

a. Subacute arteritis, like subacute phlebitis, produces coagulation of the blood in the vessel attacked, followed by obliteration of its cavity. The consequence, if the vessel is the principal one in the limb, is easily calculated. When the main venous channel is obstructed, the *return of the blood* is impeded, and œdema ensues; but in that case arterial blood pervades the limb, and it retains sensation and vitality. When the main artery is obliterated by inflammation (involving in a greater or less degree the branches), the *passage of blood into the limb* is impeded, and mortification threatened.

In a person of not very advanced age, who died of gangrene of the foot, I found the posterior tibial artery plugged with fibrin, which adhered to the inner coats of the vessel: the texture of the artery was thickened, and serum was effused in the sheath surrounding it. The coats of the artery were not ossified.

A lady, under the middle age, was seized with violent pains in the hand and arm, attended with numbness and impaired sensibility. There was no swelling of the arm or hand, but tenderness was observed in the course of the brachial artery. No pulsation was felt in the course of that vessel, or of the radial or ulnar arteries. She suffered great pain for several days, indeed till the circulation was restored by the collateral vessels. It was at first apprehended she would have lost the tops of her fingers, which however was not the case. A very small portion of the extreme point of the ring-finger was alone lost. She recovered completely the use of her hand and fingers, has had two children since the attack, and has enjoyed the best possible health. This capital example of a rare disease was communicated to me by Mr. Keele, of Southampton.

b. Acute arteritis. A soldier, aged twenty-two, died eighteen days after cutting his hand severely to escape military service, with low fever and local inflammation. Matter had formed around the palmar tendons and among the muscles of the fore-arm; the lower half of the external aspect of the radius was denuded of periosteum, and rough The radial and ulnar arteries, from the wrist to the middle of the fore-arm, were full of pus; their lining membrane was thickened, here and there eroded, and in part covered with coagulable lymph. The veins for the same extent presented similar appearances, but less in degree.—*Gendrin*, vol. ii, p. 21.

Arteries are also subject to chronic inflammation. This is principally observed in thickened and ossified arteries, particularly in aneurismal subjects. In some instances it may be regarded as the effect of pre-existing disease, but it is possible that in others the inflammation leads to these deposits. The inner coat of ossified arteries is often found soft, thickened, and of a deep red colour, which is not uniform, but irregularly disposed in the vicinity of the calcareous depositions.

The internal surface of arteries often exhibits a red appearance, which does not arise from inflammation. The internal coat is of a deep scarlet colour, sometimes throughout the whole extent of the system; in other instances, this appearance is observed only in circumscribed patches. It is attended with no deposition of lymph or thickening of the vessel; and if the inner coat be removed, the middle coat generally presents the natural appearance. The colour is probably a cadaveric stain produced by transudation.

V. *Degeneration of tissue.*

a. The internal coat of arteries is sometimes thickened and converted into a substance resembling cartilage. If the coats of the vessel are separated, the disease is found to occupy the internal coat alone; which, having lost its elasticity, sometimes cracks, and forms laminæ or scales that hang into the cavity of the vessel. This alteration of structure generally takes place to a considerable extent, and is frequently accompanied with a deposition of calcareous matter.

b. The internal surface of arteries frequently exhibits a thickened and pulpy structure, which, like the former, is confined to the internal coat. Sometimes the appearance is that of small flattened tubercles, and at others the whole surface is irregular and somewhat fleshy.

c. One of the most frequent appearances of disease in the coats of arteries is produced by a deposition of atheromatous or puriform matter, in the cellular coat that connects the internal and middle coats of the vessel. The diseased part is of an opaque yellow colour, and is generally somewhat elevated from the surrounding surface. Sometimes these elevations are considerable, and very extensive; whilst at others they are circumscribed, and have a pustular or tuberculated appearance. If punctured, matter may be pressed from underneath the internal coat, varying in consistence from that of cheese to common pus. Ulceration sometimes takes place on the surface of these elevations. The deposition of this matter sometimes proceeds to such an extent as to obliterate the arterial cavity. Calcareous matter is frequently deposited with it.

d. The deposition of a calcareous matter is so frequent an occurrence in the arteries of subjects advanced in life, that Bichat estimates its existence in seven out of ten subjects above the age of sixty; and Dr. Baillie says, that at that age it is more frequently found to have taken place, than that the arterial system possesses its original healthy structure. The appearance which it gives to the surface of an artery depends entirely upon the extent to which the deposition has taken place. Sometimes the internal coat presents numerous white specks of great minuteness; whilst, at other times, the calcareous matter is mixed with a curdy deposit, which produces a swollen and earthy condition of the internal coat. More generally, however, it forms a brittle scale or crust, which crackles under the finger like the shell of an egg. Such incrustations do not observe any peculiar shape in their formation, but are irregular, and deposited both in a longitudinal and circular direction. Sometimes they form spicula, or eminences, projecting into the cavity of the vessel, and diminishing its calibre; and not unfrequently in the arteries of the lower extremities they occupy the whole circumference of the tube, forming distinct rings, which are connected together by the intervening membraneous portions of the vessel. In the early stage of their formation they are often accompanied with a deposition of atheromatous or curdy matter underneath the internal coat, and they are frequently surrounded by extensive ulceration. In old subjects, however, they sometimes exist without any other morbid appearance in the coats of the arteries. In some cases they are probably detached from the sides of the vessel by ulceration, and falling into its cavity, have produced those instances in which loose calculi are reported to have been found in the heart and arteries.

These incrustations appear always to commence in the substance of the internal coat, and generally on the external surface of that membrane; for there is almost constantly a [illegible]cate pellicle continuous with the internal coat, extending over the calcareous matter, and separating it from the blood passing through the vessel. This pellicle is sometimes deficient, or hangs into the cavity of the vessel, and the blood is in contact with the calcareous matter. In other instances [illegible] coats of the vessel are involved in the disease, and [illegible] converted into a bony cylinder, in which no remnants of the original structure can be traced.—*Hodgson.*

The chemical analysis of the calcareous concretion in arteries, according to an analysis made by Mr. Brand, for Mr. Hodgson, is the following:—

Phosphate of lime	65.5
Animal matter	34.5
	100

The deposition of calcareous matter principally takes place in the arteries of the trunk, and in the branches of the carotid and iliac arteries, and more frequently in the second and third orders of vessels than in their ramifications. It seldom exists in the upper extremities; and it is remarkable, that although so frequent in the aorta, it is extremely rare that the pulmonary artery or its valves exhibit this morbid appearance. Disease is seldom met with in the coats of the pulmonary artery, or in any parts of the system situated on the right side of the heart.

The consequences of the changes which have been described, occurring either separately, or in combination, are of the most serious import. They are referable to two heads, the first, impaired nutrition—the second, mechanical deterioration of the vessel.

1. The cases of impaired nutrition, attributable to this cause, are,

a. Atrophy of the muscular substance of the heart dependent on ossification of the coronary arteries.

b. Ulceration. An old man of a hale florid complexion was admitted into the Middlesex Hospital, with a deep ulcer on one instep; the ulcer was nearly circular, about two inches in diameter, and nearly an inch in depth at its centre; it was eating through every texture, and had exposed several of the tarsal joints; there was little discharge from it, or pain attending it. After he had been a few weeks in the hospital, he lost his appetite and healthy complexion, when the limb was amputated below the knee. The stump went on favourably for a few days, then began to slough, when the patient sank and died. The arteries of the leg were ossified to an unusual degree.

c. The ordinary cause of senile gangrene is ossification of the arteries. This disease varies in some degree in its character in different instances. In some cases it is rapid and preceded by little inflammation, and the mortified part shrinks and dries. In other instances there is a deep redness, and considerable inflammatory swelling attended with severe pain, antecedent to the gangrene, and spreading as the latter spreads and the mortified part putrefies.

In either case, the mortification will occasionally stop; the dead part having separated, the surface which has thrown it off will temporarily heal; the disease being likely to return after a short interval.

The mechanical deteriorations of the vessels, which follow the changes above described, are dilatation; rupture; and aneurism, which originating in one or other, or both of these lesions, may *pathologically* be enumerated as a third alternative.

a. Dilatation. The commonest seat of dilatation is the arch of the aorta.

A stout man about sixty years of age had long complained of difficulty of breathing, great oppression of the chest, and frequent palpitations of the heart. He was occasionally subject to syncope, and preferred a recumbent posture. His pulse was very small, frequent, and intermitting, and his physician suspected that he had hydrothorax, or some organic disease of the heart. In this state, whilst walking across his room, he suddenly fell, and instantly expired. The right ventricle of the heart was very much enlarged and flabby. The aorta was dilated from its origin to the commencement of the descending portion into a large bag, which would admit four fingers and a thumb with great ease. It had a gradual termination, and the lining membrane was thickened, and covered throughout with earthy scales and atheromatous depositions. The semi-lunar valves were thickened, and separated from each other. The left ventricle was large, but healthy. The aorta and left ventricle were gorged with recently coagulated blood, but there was no lamellated coagulum on the surface of the dilated part.—*Hodgson.*

The common carotid artery is occasionally the seat of irregular dilatation.

I have seen the basilar artery enlarged into a fusiform dilatation an inch in length, and half an inch at its greatest thickness.

In a patient in whom I tied the external iliac for inguinal aneurism, and afterwards the common iliac to suppress a secondary hemorrhage, a length of about four inches of the upper part of the superficial femoral artery was enlarged to twice the natural diameter. The artery was uniformly diseased, with minute lines of deposit between the fibres.

In dilated arteries a whizzing or blowing is present, which has more or less roughness, according to the abruptness of the widening and contraction of the vessel, and the condition of the inner surface.

6. Rupture. The most frequent instances of rupture of arteries from ossification occur in the enkephalon. It may be presumed that their natural thinness and weakness renders these vessels more liable than others to morbid degeneration, and when diseased more liable to give way. Such instances produce sanguineous apoplexy.

Primary rupture of the vessels of the trunk and limbs is generally partial, and is usually spontaneously remedied by the condensation of the adjacent tissues, giving rise to aneurism. Primary ruptures of the large arteries of the trunk to an extent and in a situation to be rapidly fatal, are comparatively infrequent. The two following cases exemplify this occurrence.

E. Robinson, aged 65, admitted into the Middlesex Hospital under Dr. Watson, Feb. 26, 1833. Ill three days: was attacked before breakfast with loss of consciousness; on recovery felt pain at the back of the head, with numbness of the right arm and leg; can only lie on the right side for palpitation. Systolic sound of the heart less; impulse greater than natural. After going on favourably to that time, on the 6th of March she was suddenly attacked with convulsions, and remained insensible, breathing without stertor, pale, the pulse small and weak, till her death at two p.m. on the 9th.

Inspection.—Sanguineous effusion on the surface of the hemispheres, and softening of the under part of the cerebellum. The pericardium filled with a firm coagulum, which formed a bag enveloping the whole heart, and admitting of being removed entire. It adhered slightly to the auricles. The blood of which it was formed appeared to have got in through a slit in the pericardium, at the angle of its reflection from the aorta. A little above this was a clean transverse rent upwards of an inch in length through the front of the aorta; at this part a large coagulum of blood lay between the middle and outer coats of the vessel. The latter had probably first given way, and afterwards the outer coat had been rent through into the pericardium. The inner surface of the aorta was covered with opaque yellowish spots, some bony; there was no dilatation.

Dec. 19, 1835. Nine o'clock, p.m. A cold night, and east wind.—A gentleman, aged 35—tall, muscular, thin—countenance and lips pale, his body very cold, and especially his right arm and fingers cold as marble. The limb is not sensible to touch, but he complains of pain and cold in it. It is paralysed; he moves it by the shoulder. The fingers and wrist are usually half bent, but will remain in the position in which they are placed. The elbow joint is nearly straight; he once bent it slightly. No pulse in the radial, ulnar, or brachial arteries; immediately above and below the clavicle the artery throbbed perceptibly. Pulse in left wrist small—80. He is lying on a bed, covered with blankets, and is perpetually moving. He complains of feeling uneasy all over, but of no pain excepting in his arm. He breathes easily, yet often gapes and yawns. He becomes confused when he attempts to speak at any length, but makes short answers without any hesitation or mistake. The systolic sound and the impulse of the heart are natural. The diastolic sound not distinguishable—in its place a sort of blowing noise.

His account is, that about half an hour ago he felt a "*sort of revulsion*;" meaning by this term sudden pain, extending from his throat down his chest and belly, and a sensation as if he were dying. His left arm and leg then became very numb and cold, and he could not move them: they shortly recovered, and his right arm was affected as described. He had been previously perfectly well. The servant says that he complained of headache in the afternoon.

Dec. 20. Eight o'clock, a.m.—He had been dead about three quarters of an hour. Thin blood trickled from a puncture made in the right external jugular vein. The pupils are dilated. Body warmer than it was last night. It is very pale, but not in the least stiff.

He had not slept during the night. About 12 he vomited the medicine he had taken. Subsequently he had one stool. He had talked and remained much as he was in the evening until 7¼ o'clock, a.m.; when the servant, who was in the next room at the moment, heard a great gurgling in the throat, chest, and belly, and thought at first that his bowels were suddenly purged. He never moved after that time.

Inspection.—Dec. 21. 10½, a.m.—The body stiff and pale, not quite cold yet. Maculæ mortuæ on all depending parts. The radial, ulnar, and brachial arteries of the right arm were flat, thin, and seemed to be deficient in elasticity, and contained a small quantity of fluid blood, and the veins did not hold more. In dividing the cartilages of the ribs on the left side, the pericardium was pricked, and serum of a straw colour spirted out, ʒ iij or iv. The cavity of the left pleura was full of fluid blood, and the lung dark-coloured, heavy, and compressed. The right lung appeared healthy. The pericardium contained about ℥vj of clotted blood. The heart hard, and very large. A considerable ecchymosis (under the pericardium) was observed around the origins of the aorta and pulmonary artery, and about the right auricle. On slitting up the aorta from below, several patches of opaque, yellowish, and in some parts bony substance, appeared between the inner and middle coats. The aorta was large, and especially the first portion of the arch. The cellular membrane around the arch of the aorta contained clotted blood, by which also the external coat of the aorta was separated from the middle tunic, or at least from most of it, for a few circular fibres were attached to the interior of the cellular coat. This separation extended to the origin of the aorta, where it ended in a transverse slit in the inner and middle coats, immediately above the valve which has no corresponding coronary artery. No distinct opening could be traced into the pericardium from this slit, but in two or three places the membrane seemed so thin, that probably the aperture was concealed by the distension with blood of the cellular membrane beneath; or the blood may be supposed to have transuded. A similar, yet smaller transverse slit, appeared at the commencement of the arteria innominata. The sides of the left ventricle were enormously thick, and its cavity enlarged—it contained a small clot. The mitral valves very large and thickened at parts, but to no great extent. The auriculo-ventricular orifice large. All other parts of the heart healthy.

The vessels of the scalp contained a good deal of fluid blood. The brain was perfectly healthy. In the arteries at its base were a few opaque spots.

The small intestine was gorged with blood. An immense quantity of clotted blood was effused behind the peritoneum, along all the extent of the abdomen, aorta, and especially around the kidneys. On slitting up the aorta, two or three transverse slits were observed, similar to those mentioned to have been found in the thoracic vessels, with a like separation of the arterial coats.

A gonorrheal discharge appeared at the orifice of the urethra. Connected with this circumstance it may be remarked, that he was making water at the time he felt " the revulsion."

It is remarkable that the blood in the cavity of the pleura had not clotted, nor had that contained in the vessels, whilst that effused into the pericardium and into the cellular membrane, and what little was found in the heart, was perfectly clotted. But no light-coloured fibrinous masses were found, as is sometimes the case.

c. *Aneurism.* An aneurism is a sac filled with blood, fluid or coagulated, and communicating with an artery, through the rupture or dilatation of which it has been produced, and of the coats of which, or of the adjacent cellular tissue, it is formed.

Aneurism may arise either from disease, or from an injury of an artery. The degenerations of tissue, which have been above described, and that may lead, as it has been mentioned, to general dilatation of an artery, may likewise lead to its partial dilatation ; one side of a diseased vessel being weaker than the rest for a small extent, may become sacculated, all its coats yielding and concurring to form a sac. This variety is called *true* aneurism ; the blood found in it is in a fluid state. But as such an aneurism increases, it commonly happens that the inner coat or coats give way at one or more parts ; at which parts the dilatation proceeds more rapidly than before : the blood in contact with the new and abraded surface coagulating, forms a stratified clot of several layers. Such an aneurism is called a *mixed aneurism*. Again it fully as often happens, that the aneurismal sacculation primarily results from the giving way of the inner coats of the artery at some point, where they have been weakened either by the thickened inner membrane splitting off in laminæ, or through its being partially absorbed over a flake of phosphate of lime, which thus has become detached : the sac is then formed of something external to the tunic immediately diseased. This kind is called a *false aneurism:* it contains two varieties ; for the sac may be formed either of the outer coat of the vessel, or that having additionally given way, of the neighbouring cellular membrane. In either case the sac contains more or less stratified coagulum.' Arteries, again, which are not diseased, are liable to become aneurismal in consequence of injuries. Aneurisms of this kind are called traumatic. They present three varieties. To exemplify the *first*, when the temporal artery has been opened, if the bandage is removed too soon, within twenty hours for instance, the wound is found indeed to have united by adhesion; but the artery is weak at the line of adhesion, and its texture that required support gives at that part, and an aneurismal sac is formed. *Secondly*, if an artery in a fleshy part is punctured, although the wound of the integuments may admit of being healed through pressure, the wound of the artery is kept open by the force of the blood which issues from it, and drives against the cellular membrane, and dilates and condenses it into an aneurismal sac. *Thirdly*, an artery may be completely divided or torn asunder, with the same result; only that in this case the end of the artery, not the *side*, opens into the sac. I have seen this case happen in two ways. As an instance of the first — a lady fell upon the nates, against the edge of a step, and ruptured the gluteal artery; a tumour of the size of an orange immediately arose at the part, and there was ecchymosis from the heel to the head: the patient recovered with rest and cold. The other case was the following: the profunda, in an amputation of the thigh, was not tied cleanly, but the ligature was applied round some fibrous and muscular substance, which was supposed to include the artery: but instead of this happening, the artery slipped back and eluded the ligature; the ligature being thus tied before, not on the vessel, blood was poured from the vessel into the muscular and cellular tissues, which gave way about seven days after the amputation, and the hemorrhage destroyed the patient. The last form of traumatic aneurism is the aneurismal varix, in which the artery having been punctured through a vein and the external wound healed, leaves a communication between the two vessels: the blood rushes from the artery into the vein, and dilates it into a sac over the point of communication. In the aneurismal varix, as in true aneurism, the blood is in contact with a surface natural to it, and does not coagulate.

The ordinary progress of aneurism is the following: the sac gradually yields, and becomes partially filled with stratified clot, of which the oldest-formed layers may be distinguished by their lighter colour; the sac again partially yielding, often throws out additional sacs. The soft parts become displaced, and the bones are absorbed under the pulsating pressure. At length the sac gives way. The result is likely to be immediately fatal, if the aneurism burst upon the pulmonary surface, into the pleura, pericardium, or peritoneum, in the cranial cavity, or through the integument or intestine. But the rupture of the sac is not even then necessarily fatal at the instant: the patient fainting, the aperture may be plugged with coagulum, or the opening may be among tense parts, which will form a second sac. The patient thus may rally, to perish by a return of hemorrhage. Or the aneurism may open into a vein; if such an opening be from an aortic aneurism into the cava, tumultuous disturbance of the circulation and instantaneous death ensue. If the opening be from a membral aneurism into a vein, as from a popliteal aneurism into the popliteal vein, no immediate disturbance is observed. But, as in the case recently communicated by Mr. Perry, the blood now returning in part by the vein, imparts to the venous circulation of the limb a peculiar thrill, while the artery above the communication enlarges to allow a freer passage of the blood, to make up for what is thus lost to nutrition; and the vein dilates from increased pressure. In Mr. Perry's case, the femoral artery was of three times the natural diameter, its coats uniformly thin, but smooth and regular.

The diagnosis of aneurism is not difficult in general in the limbs, or in the neck or axilla. There is a pulsatory tumour, of which the growth has been rapid, which is diminished by pressure, when the artery leading to it is compressed, and on the pressure being removed fills with a peculiar thrill. In general, but not always, a blowing sound is heard in the aneurism.

Internal aneurisms are often difficult of detection at their commencement; when of any size, if at the arch of the aorta, they simulate disease of the valves of the heart with hypertrophy, and are with difficulty identified. When the aneurismal tumour, pressing on the adjacent internal parts, causes pain under the sternum, or in the throat, extending to the arm, sometimes with numbness, difficulty of swallowing or breathing, and when the patient experiences an unnatural beating in the upper part of the chest, the disease may yet not distinguish itself from tumours of other kinds which may produce these symptoms. But when an impulse is felt under, or a little to the right of the sternum, greater than that felt in the region of the heart, and especially if the impulse be accompanied by a single loud sound, whether this sound be grating or not, there can be little doubt of there being aneurism, or considerable dilatation of the aorta.

It is interesting to investigate the methods by which aneurisms are sometimes spontaneously cured.

1. By *sphacelation.*

An athletic dragoon, thirty-five years of age, ascribed to great exertions during a very severe field day, the origin of an aneurism in his right groin. The tumour increased rapidly: in a few weeks it was as large as a melon, and extended several inches above, as well as below, Poupart's ligament. It pulsated violently; its parietes were very thin, and its surface was inflamed. He was placed upon the lowest diet, and repeatedly bled from the arm, more particularly and largely when the pulsation in the tumour was much increased. On visiting him some time after he had been under this debilitating treatment, during which the tumour had acquired a greater degree of solidity, the integuments on its apex were observed to have become very livid, and were covered with numerous vesications, containing dark-coloured serum. The pulsation about the same time ceased, and the surface of the tumour became black and flaccid. The man's death was momentarily expected. The parts became more discoloured, until at length a small opening formed in their centre, from whence issued a large quantity of dark, partly coagulated fœtid blood. The sloughing became more general, particularly around the circumference of the tumour. It extended in the perineum to the raphe, to the spine of the ilium, upon the abdominal muscles, and down the thigh. When the sloughs separated, many pounds of coagulum were discharged, until the whole cavity was cleared. T sloughing sac was gradually cast off, and, after a most tedious process, the sore assumed a healthy appearance; the edges began to granulate and discharge healthy matter. During this process, nature was left almost entirely to work the cure. The patient was extremely low; so much so once or twice, as to excite considerable alarm for his safety. His pulse could scarcely be felt, and he had frequent attacks of syncope. He was allowed wine and cordials. The immense chasm in his groin gradually filled up. The edges were approximated with adhesive straps; but it was more than twelve months before it had cicatrized. At the end of that time he was perfectly well, and remained in the hospital many months after the cure, during which time his health was good, and he suffered nothing from the remains of the disease but the inconvenience of so large a cicatrix.—*Hodgson.*

2. By reflection of the enlarging sac upwards in such a manner as to press upon, and obstruct the flow of blood in the artery *above the aneurism.*

A gentleman, about thirty years of age, after a day's hunting, felt a pain in his thigh, which he considered as rheumatic. A month afterwards he perceived a small pulsating tumour in the course of the femoral artery, about four inches below Poupart's ligament. The tumour increased, and the leg and thigh became œdematous. He was bled copiously, and adhered to a low diet. Compresses were applied above the tumour in the course of the femoral artery, as high as Poupart's ligament, and the limb was rolled equally and tightly from the foot to the groin. The application of the roller increased the pain, and he suffered much from fever. This plan was continued for some months, when on a sudden the whole limb became extremely cold and benumbed, the tumour and upper part of the thigh put on a livid appearance, and serious apprehensions were entertained for the safety of the limb, which was hourly expected to become gangrenous. On the morning subsequent to this alarm, the pulsation in the tumour had ceased, but the livid colour and defect of sensation continued. The pain was abated, his fever was less, the warmth of the limb began to return, and the tumour to diminish. From this time he continued to recover: but it was long before the limb regained its natural sensation, or the œdema subsided. At the end of six months he suffered no inconvenience from the remains of the disease, except that the upper part of the thigh was four inches more in circumference than the opposite limb in the same situation. In this state he remained twelve years, when the swelling began to enlarge, and was attended with a dull pain after violent exercise.

From this time the tumour gradually increased; when Mr. Hodgson saw him, twenty years after the commencement of the disease, it had grown to an immense size, but did not possess any of the characters of an aneurism. It had a firm fleshy feel, was void of pulsation, and no fluctuation could be discovered in it. It continued to increase for two years, when its apex sloughed, and a quantity of brown sordes was discharged, mixed with clots which had very much the appearance of lamellated coagulum in a putrid condition: no hemorrhage took place. A large cavity was thus exposed, the surface of which assumed a sloughy aspect, and he died in consequence of the fever and irritation with which it was accompanied. Upon dissection, the sides of the tumour, consisting of a firm fleshy substance, were found to be in a sloughing condition, but no large blood-vessel communicated with the cavity. The femoral artery, before it penetrates the tendon of the triceps, was obliterated for the space of three inches. The body of the sac was reflected upwards upon the obliterated portion of the artery, which must have been compressed between the sac and the femur. Below the obliterated part the coats of the artery were remarkably diseased, and were dilated into a small sac in the ham. In this case it appears probable, that the cure of the aneurism was the consequence of the obliteration of the upper part of the artery, which was compressed between the tumour and the femur: a diseased action seems after some years to have commenced in the remains of the sac, which became a sarcomatous tumour, containing a grumous fluid mixed with clots, very like lamellated coagulum in a putrid condition.

The pressure of an aneurismal sac has been known to obliterate an adjacent artery. Sir Astley Cooper has mentioned an instance in which the cavity of the common carotid artery was obliterated by the pressure of an aneurism of the aorta, which extended up the neck by the side of the trachea. Mr. Hodgson met with a case in which the cavity of the left subclavian artery was obliterated by the pressure of an aneurism of the arch of the aorta. At the origin of the subclavian artery there was also a small aneurism, in which the process of spontaneous cure by the deposition of lamellated coagulum had commenced in consequence of the obliteration of that portion of the vessel which communicated with the humeral extremity of the sac.

3. *By the blood in the sac clotting, and converting it into a solid tumour.*

A miller, about fifty years of age, had for five years before his death been afflicted with severe symptoms of asthma. Various medical men considered him as labouring under that peculiar asthma to which those who follow his occupation are subject. His symptoms, however, were always relieved by copious bleedings. The above was all the information which could be procured relative to his disease, when the body was examined. The lungs were perfectly healthy. A small aneurismal sac originated from the posterior part of the arch of the aorta close to the root of the arteria innominata. This sac was about the size of a common walnut, and the coats of the aorta were deficient at its base for the space of about the size of a sixpenny piece. The cavity was completely filled with very firm layers of coagulum, resembling more the appearance of boiled muscle than any other substance. The opening by which the sac had communicated with the aorta was blocked up by the base of the coagulum, but the cavity of that vessel was not in the least diminished. The tumour adhered posteriorly to the trachea, which was thrust out of its natural position, and had assumed a very remarkable curve, by which its calibre was reduced to one half of the natural dimensions. The coats of the aorta were thickened, and covered with steatomatous and earthy depositions.

The two latter instances, for the first is too hazardous, and in nature's hands too commonly fatal to be imitated, contain the principles of medical and surgical treatment of aneurism.

As regards medical treatment, — an aneurismal patient should be lowered by repeated bleedings and restricted diet, and be kept tranquil and undisturbed in body and mind. These conditions at once retard the enlargement of the sac, and increase the tendency of the blood to coagulate in it.

The *surgical treatment* which is to be resorted to, when not contravened by the co-existence of *internal* aneurism, or an unfitting state of health, or the situation of the aneurismal vessel, consists in tying the artery on the cardiac side of the tumour; — not too near to it, lest the ligature should be applied on a part more diseased than the rest; — not too far from it, lest the collateral circulation should restore the direct current into the aneurism; — not to a point of the artery immediately beyond the giving off a considerable branch, lest the blood passing along that branch should prevent the formation of the clot necessary for the security of the operation. In the single instance of aneurism of the common carotid, the operation of tying the artery on the distal side of the aneurism (supposing the cardiac side inaccessible) is to be practised. *That* operation is inadmissible, unless you can be *sure* that no branch intervenes between the ligature and the aneurismal tumour.

[*s*. 60.] Hypertrophied artery.

[*s*. 65. 66. 67. &c.] Degeneration of tissue.

[*s*. 70. &c.] Aneurism.

M. Jules Cloquet gives a remarkable instance of disposition to true aneurism in a subject aged fifty. Numerous sacculi were found in all the second-sized arteries. The aorta and primary branches had fewer. There was no alteration of tissue; but the sacculi were thinner, as if produced by simple dilatation. The same author quotes a case of arterial hypertrophy occurring in the common and external and internal iliac trunks. These vessels, for their whole length, were elongated, sacculated, tortuous: the middle coat had lost its yellow colour, and in many places looked like a thin layer of fibro-cartilage: it was supple and elastic in the direction of the breadth of the vessel.

SECTION IV.

The Heart.

I propose to treat of the pathology of the heart under the following heads: — affections of the pericardium; affections of the valves and lining membrane; affections of the muscular texture; functional derangement; malformations.

It may be useful to prefix a short account of the natural size and position of the heart, and of the causes which produce the sounds that attend its healthy action.

a. Size. The heart, comprising the auricles, ought to have a size either equal to, or a little less, or but little larger than, the fist of the subject. The walls of the left ventricle ought to have a thickness a little more than double that of the walls of the right: they ought not to collapse when an incision is made into the cavity. The walls of the right ventricle should collapse when cut through. The four cavities of the heart have nearly an equal capacity; but those of the right side rather exceed those of the left, and often appear greatly to surpass them, in consequence of distension with blood.

b. Position. A straight line drawn across the breast bone, uniting the lower edges of the cartilages of the third ribs at their sternal insertions, passes before the valves of the pulmonary artery a little to the left of the mesial line: the valves of the aorta are situated directly behind the pulmonary valves.

From this point the aorta and pulmonary artery ascend, the former inclining forwards and to the right; so as, upon emerging from behind the pulmonary artery, to come in contact with the sternum, and to the right of the mesial line: the latter, which is from the first in contact with the sternum, inclining more considerably to the left, till it arrives at the margin of the interspace between the insertions of the second and third ribs.

A vertical line coinciding with the left margin of the sternum has about one-third of the heart, consisting of the basial portion of the right auricle and right ventricle, on its right, and the remaining portion of the right ventricle and the whole of the left on its left. The left auricle is situated deep behind, and to the left of the heart at its upper part, opposite to the interval between the cartilages of the third and fourth ribs.

The apex of the heart beats against the cartilage of the fifth rib, or against the interval between the fifth and sixth.

The heart rests on the tendinous centre of the diaphragm, which is stretched horizontally to form the floor of the chest, at or a little below the level of the lowest part of the fifth rib.

The lungs descend along the margin of the sternum about two inches apart, and overlap the base of the heart slightly on the right side and more extensively on the left: then receding from each other, they leave a considerable portion of the right ventricle and a less extent of the lower part of the left in immediate contact with the sternum and fourth and fifth costal cartilages.

c. Sounds attending the action of the heart. The sounds produced during the natural action of the heart are two, which bear the following relation in time to each other and to the interval between two beats: when the pulse is sixty in a minute the first sound lasts half a second, the second sound a quarter of a second, the interval the remaining quarter of the second.

The first sound is duller and prolonged, the second smarter. The first sound corresponds with the systole of the ventricle, the second with its diastole. This was ascertained by experiments made by Dr. Hope, some of which I witnessed.

The first sound is probably caused by the flapping to of the mitral valves and protracted vibration of the cordæ tendineæ, the second by the flapping to of the sigmoïdal valves. It was found by Dr. Hope, that preventing either valve from closing, by wires passed into the heart, put an end to or impaired the sound attributed in the normal state to its shutting.

The first sound is to be heard by the stethoscope applied over the ventricles, the second by the stethoscope applied either over the ventricles or over the aorta or pulmonary artery.

I. *Pericardium.*

a. Acute inflammation of the pericardium produces immediate effusion. The appearances observed relate to modifications of the effusion, not to the condition of the membrane itself. The latter is not thickened: and when there is most effusion, the colour of the pericardium is often natural; and when redness is seen, the redness seldom is spread over the whole surface, but has a dotted or mottled character, or presents numerous small scarlet specks upon a ground of the natural colour.

The effusion consists of lymph and serum, or pus. The two first are the most common. When first effused, they are probably nearly pure *liquor sanguinis*, — the blood without the coloured particles. The lymph then coagulates; the serum remains fluid. The latter is generally transparent, and of a faint yellow or fawn-colour; sometimes turbid and semi-opaque or wheyey, sometimes bloody. The quantity, though variable, is in general considerable within the first two, three, or four days of the disease, and may amount to five or six ounces; but it frequently amounts to more than a pint. Corvisart once found four. It is speedily diminished by absorption, when the first violence of the inflammation begins to subside; and after the lapse of a few days, the serum is in the majority of cases not more abundant than the lymph. Sometimes in those who have died of very acute inflammation, no serum whatever is found; while a copious exudation of thick concrete lymph fills and agglutinates the whole cavity.

The lymph which coagulates on the opposite pericardial surface assumes, upon its free surface, a variety of forms. Sometimes it has a cellular arrangement, and, according to the fancy of different observers, is thought to resemble lace-work, or a sponge, or a honeycomb, or some specimens of coral, or the interior of a calf's stomach: sometimes it bristles with a multitude of small short-pointed papillæ; less frequently it is softer and shaggy; always it is rough or uneven. [*t.* 21. 22. 23. 24. 25.]

Sometimes partial adhesions take place, which by the motion of the heart become elongated. [*t.* 26.]

In general (the patient surviving) universal adhesion ensues. When the fluid has been sufficiently absorbed, the depositions of lymph on the opposite surfaces of the pericardium come in contact, unite, and gradually become organized by vessels presenting themselves under the successive appearances of blood-stains, straggling lines, and, lastly, of uniform purplish vascularity susceptible of injection from the vessels of the heart. The depositions are thus converted into perfect cellular tissue, by which the contiguous surfaces are more or less firmly, closely, and extensively agglutinated. When adhesion is of recent standing, the lymph is generally thick, and separable by mere tearing into two layers, one adhering to each pericardial surface. In proportion as the disease is older, the false membrane is thinner and firmer, consisting, in cases that date several years back, of the finest layer of dense cellular tissue. [*t.* 28.] In some, the removal of the thickness of the uniting layer is so complete, as to give the idea of direct union having been effected.

Purulent matter is not common in pericarditis, and appears to depend upon the protraction of the acutest form of the inflammation. It is met with diffused through the whole cavity, or in circumscribed chambers between the adhesions.

The muscular structure of the heart is rarely invaded by inflammation. Dr. Latham, however, met with a case of carditis (in which death took place after an illness of only two days), when "the whole heart was found deeply tinged with dark-coloured blood, and its substance softened; and here and there, upon the section of both ventricles, innumerable small points of pus oozed from among the muscular fibres." Mr. Stanley records another. It is probable that alterations in the colour and consistence of the flesh of the heart occurring with pericarditis are results of lesser degrees of inflammatory action that has spread from the membrane.

The occurrence of inflammation of the lining membrane in conjunction with pericarditis will be afterwards adverted to.

In general, the symptoms of pericarditis are sufficiently pronounced—acute inflammatory fever—pain in the region of the heart, extending to the left shoulder and arm—hurried breathing — palpitation — the expression distressed and anxious. But there are cases in which these symptoms are not manifested; and the disease is liable to be overlooked, and difficult, when looked for, to be identified. A symptom, however, may generally be detected, to which the attention of physicians has been drawn by Dr. Watson, that furnishes a certain ground of diagnosis in many of the most obscure as well as in the otherwise best-marked cases. The symptom referred to is a murmur heard equally during the systole and diastole of the ventricle: it appears to be superficial, and is produced by the motion on each other of the surfaces of the pericardium roughened by lymph. Dr. Watson uses the term *to and fro sound*, to denote this sign. The sound is not, however, always to be perceived with equal distinctness: it is heard at the commencement of pericarditis, and continues audible as long as there is no great quantity of serum; it then nearly disappears, but is heard again later in the disease, when, from the serum being absorbed, the surfaces again touch over a larger extent. It is likewise not always distinguishable from valvular murmurs that attend both the systolic and diastolic sounds.

A systolic murmur is generally heard in pericarditis: this is supposed to be often produced by an accompanying roughened state of the valves from inflammatory vegetations adhering to them. But it is not impossible that an increased and smarter action of the ventricle may alone be sufficient to produce it.

When any considerable quantity of fluid is forced out into the pericardium, other signs make their appearance. A dulness of the fore-part of the chest on percussion, arising from the lung being pressed aside by the distended pericardial sac, which takes its place; and sometimes a peculiar tremor perceptible to the touch from the undulation of the liquid in which the heart is beating.

Pericarditis is not commonly fatal at the first attack: by bleeding and calomel the inflammation is generally arrested, and the absorption of the effused lymph and serum promoted. What the practitioner apprehends for his patient, is the gradual invasion of hypertrophy from the adhesion of the pericardiac surfaces, and of valvular disease commencing in thickening of the valvular membranes determined by coexistent endocarditis. It is probable, however, that both of these dangers are considerably overrated.

b. Deposit of flakes of phosphate of lime is liable to take place below the pericardium.

c. Melanoma and medullary sarcoma, separate or mixed [*t.* 35.] are occasionally found in tubercles below the pericardium.

2. *Affections of the inner or lining membrane.*

Valvular disease of the heart consists in the formation of deposits or growths in or upon the fibro-serous membranes of which the valves are framed. The mechanical consequences of these formations are, permanent narrowing of the valvular openings on the one hand, and on the other imperfect action of the valves when they should close. The valves of the left side of the heart are more frequently diseased than those of the right; and when the two are simultaneously affected, those of the left side are commonly the most disorganized. When the system and the circulation are tranquil, there may be great contraction and immobility of the valvular orifices without prominent symptoms: when, on the contrary, the circulation is strong and excited, dyspnœa, palpitation, and a long train of distressing sensations, make their appearance.

The sources of valvular disease are twofold; being either inflammatory growths and thickening, or ossific degeneration.

a. Inflammatory action, which is to the full as often determined to the inner as to the outer membrane of the heart, as a consequence of the rheumatic diathesis, produces two effects on the fibro-serous texture of the valves. This texture becomes *internally* thickened by infiltration with lymph, so as to resemble a close fibrous or even fibro-cartilaginous tissue; and *externally* covered with little fleshy vegetations or excrescences, which are found either isolated or in clusters, and are of a yellowish-white or reddish colour, and of different degrees of firmness; in figure sometimes nodular, sometimes like fine serræ jagging the free edge of the valves. [*t.* 44, 45.] These little warty excrescences consist of adherent and firmly organized fibrin, which has either exuded from the adherent surface, or has coagulated from the blood flowing over it. In an experiment upon an ass, in which I assisted Dr. Hope, the aortic valve, which had been held aside by a wire passed into the vessel, was found, when examined a few minutes afterwards, to be studded with these warty excrescences, which admitted of being easily scraped off from the internal membrane.

2. [illegible] degeneration, resembling the like change in the arterial tunics, is liable to occur in the valves of the heart. Irregular concretions of phosphate of lime, often mixed with atheromatous matter, being deposited underneath the serous membrane, and producing its partial absorption. The rough masses of phosphate of lime project into the cavities in various sizes and figures in the stream of blood flowing through the cardiac cavities. [*t.* 45 to 48.]

These two forms of disease continually occur in combination. Phosphate of lime is often deposited in the thickened fibro-cartilaginous valve; and, on the other hand, the membrane covering a primary deposit of bone frequently becomes the seat of a secondary inflammatory vegetation. When disease of this nature has once commenced, it is evident that it must be progressive: the diseased valve is never withdrawn from the constant friction and pressure of the blood. As the thickening of the valve goes on increasing, its free edge becomes irregularly fissured: at other parts the investing membrane becomes thinner and extenuated, and is finally ruptured through or torn from its adhesion.

Consequences of valvular disease of the heart. When the aortic valve (alone) is thickened to that degree, with or without fissure or laceration, that it cannot rise and fall so as alternately to leave the passage into the artery free, and to close it, it will follow, first, that the second sound is small or imperfect; secondly, that the passage of the blood over the roughened valve at the time of the first sound will produce a vibration of the valve which will cause a murmur of greater or less sharpness (I have heard it musical, like the cooing of a dove); thirdly, that the refluent passage of the blood into the ventricle will produce a less degree of the same murmur; fourthly, that the pulse will be sudden or jerking, the fulness of the artery not being sustained during the diastole of the ventricle by the aortic valves.

Similar disease occurring in the mitral valves (alone) leaves the second sound of the heart distinct and clear, and does not materially interfere with the first; but the passage of the blood over the valve produces a murmur both at the time of the first sound and of the second, which is principally to be distinguished from the murmur of diseased aortic valves through its situation—that is to say, by its not being heard by the stethoscope applied over the aorta, while it is heard satisfactorily when the instrument is applied over the ventricle. Disease of the mitral valve produces intermission of the pulse: if the left auricle discharges a small volume of blood into the ventricle, the latter in its systole throwing half the quantity or more back into the auricle, the quantity propelled into the aorta is not sensibly felt at the wrist. The same thing may happen at the ventricular systole, the pulse being then only felt at the wrist when the left auricle is full enough to prevent material regurgitation into it from the ventricular contraction.

Disease of the valves of the pulmonary artery is stethoscopically distinguished by its place and superficialness. Disease of the tricuspid valves is of extremely rare occurrence, but may be identified in a similar manner.

The extreme interest of this subject, into which my limits prevent my entering at any length, may be exemplified by pursuing the following train of morbid sequences. Suppose the mitral valve to be thickened and contracted, the auricle t bour doubly; in its systole it has to force the blood ugh a rigid and narrow passage, in its diastole it has no ection against the systole of the ventricle. The auricle distended with blood, and acting forcibly, the pulmo- vessels must become gorged; hence oppressed breath- p ing of blood, pulmonary apoplexy, serous effusion lungs. The vessels of the lungs being loaded, the ventricle must exert unusual force to drive its blood the pulmonary artery; hence it will become dilated, it the same time probably hypertrophied: the ventricle , its auricular ope gradually yield, and the be forced backward uricle at the ventricular ; from the right au irse the refluent pressure upon the systemic v systolic pulse is thus ced in the veins of it the same time œdema produced; or, to ro etarded column of blood e inferior cava, hepa stion and ascites, venous ion and œdema in the wer extremities may ensue. eart at the same time, over ought and irritable, is the of pain and palpitation alternat ng with syncope. This nce may serve to illustrate the use of pathological owledge: a few principles justly laid down, the explanation of an immense assemblage of complicated phenomena is naturally and easily deduced from them.

The inner membrane of the heart, where it is reflected over the muscular structure, is often the seat of inflammation, which leaves patches slightly thickened or covered with adherent vegetations. The same part of the membrane sometimes gives attachment or origin to pendulous tumours, which, if of gradual formation, and not of considerable magnitude, only produce symptoms when they happen to be so placed as to interfere with the action of the valves.

[*t*. 55.] is a tumour as large as a walnut, firm, and in a section resembling a clot of blood, growing from the left side of the septum of the heart, and projecting into the left auricle. It probably interfered with the closure of the mitral valve, towards which it projected: and I am assured, that, during life, the first sound of the heart was wanting, and the diastolic attended with a murmur. The tumour was either medullary sarcoma, or an instance of slowly-forming polypus. It seems now sufficiently established, that the blood will occasionally clot in the cavities of the heart during life, and form adherent tumours. The clots that are supposed to form during life are distinguished by being of much firmer consistence, more opaque, and less charged with serum than the coagula which form after death. Their texture is more distinctly fibrous; they are often arranged in concentric layers: they are commonly found on the left side of the heart. In some of them a cavity is found containing blood, or matter like the lees of wine, or pus. M. Laennec thinks that polypi of considerable magnitude (of sudden formation) may be recognized by the following physical signs. When in a patient who till then may have presented regular pulsations of the heart these suddenly become so anomalous, confused, and obscure, that they can no longer be analysed, we may suspect the formation of a polypous concretion; and if this disturbance takes place on one side only, the indication is almost certain.

III. *Alterations of the muscular structure of the heart* may be classed under the heads of inflammation, hypertrophy, atrophy, steatosis, cysts, and morbid growths.

a. Inflammation.

1. *Acute.* This rare affection has been already adverted to in connection with pericarditis.

2. *Chronic.* To this head may be referred *induration* of the heart. The muscular substance is hardened so as to present unusual resistance to the scalpel, the colour unaltered. It generally occupies the whole of a ventricle, but sometimes only a portion; and it may accompany any state of the organ as to size, though most commonly it is conjoined with hypertrophy.

b. Hypertrophy is an augmentation of the substance of the heart from excess of growth. It presents three varieties: hypertrophy of the valves without alteration of the cavity; hypertrophy with enlargement of the cavity; hypertrophy with contraction.

The muscular substance in hypertrophy is usually firmer and redder than natural. The augmentation of growth may be confined to a single cavity, or it may affect several and even the whole simultaneously. Sometimes one cavity is thickened while another is attenuated. The ventricles are more frequently hypertrophied than the auricles. When all the cavities are hypertrophied, and at the same time dilated, the heart attains a volume, two, three, and occasionally even four times greater than natural: its form instead of being oblong is spherical, its apex is hardly distinguishable, and it encroaches so far upon the left cavity of the chest as sometimes to raise the lung as high as or higher than the fourth rib; sometimes even it occasions a preternatural prominence at the præcordial region.—*Hope.*

The left ventricle is more prone to thickening, and not less to dilatation, than the right. The valves of the left ventricle, the natural thickness of which averages about half an inch in the adult, may be increased to the extent of one or one and a half to two inches. The cases are rare in which it exceeds an inch and a quarter. The situation of the greatest thickening is usually a little above the middle of the ventricle, where the columnæ carneæ take their origin. Thence the thickness decreases rather suddenly towards the aortic orifice, and gradually towards the apex, where it is reduced to less than half. When hypertrophy maintains these proportions in the different parts of the ventricle, the state is only an exaggeration of the natural form. The case is different when the hypertrophy takes place inwards, and diminishes the cavity; for then the whole ventricle is nearly equally thickened, and its form is unusually globular.—*Hope.*

Hypertrophy of the heart, we may presume, is produced by all the causes which promote increased action of the muscular fibre of the heart in persons of a strong frame and sanguine temperament. These causes are either general or local: the general are either mental or physical — strong excitement or bodily exertion; the local, obstructions to the passage of the blood calling for unusual effort (so hypertrophy of the left ventricle is produced by contraction of the aortic opening, of the right ventricle by disease of the mitral valve, or by any impediment to the pulmonary circulation), or embarrassment of the free play of the heart by adhesions of the pericardium, necessitating in another way unusual force.

Protracted rheumatic fevers are said to have given rise to hypertrophy, when there has been apparently no inflammation of the heart or its membranes.

The symptoms of simple hypertrophy of the left ventricle, are such as result from its increased force; a strong impulse is felt at the ventricular systole, which is of unusual duration, heaving up the chest, and prolonging the pulse. If the hypertrophy is unattended with dilatation, the natural systolic sound is distinct and dull; if attended with dilatation, the sound is loud and smart. The direct tendency of the disease is to induce apoplexy. Hypertrophy of the right ventricle tends to produce pulmonary congestion, spitting of blood, pulmonary apoplexy. The capillaries oppressed by a too powerful impulse from the heart, give passage to the serum, and anasarca ensues. The heart, irritable from the violence of its action, is easily excited to fits of palpitation.

The relation of hypertrophy to valvular disease is complicated and curious. Hypertrophy in some instances is caused by, and corrects the latter. Suppose the aortic aperture narrowed, and its valvular structure too rigid to close; the left ventricle has double work in impelling the blood through it, and at its diastole is oppressed by regurgitation. Called upon for unusual exertion, the left ventricle in a strong heart becomes under these circumstances hypertrophied; and it will sometimes happen that the increased force it thus obtains will for a time only and sufficiently balance the impediment at the aortic valve. In other cases, hypertrophy may produce valvular disease, and its effects be aggravated through the latter cause.

3. Atrophy of the muscular structure of the heart presents three accidental varieties of feature.

a. Simple atrophy. The heart collapsing by its own weight, its texture soft, and rather of a darker red than usual, or of a faint yellow, or fawn colour. The symptoms, probably a quick, feeble, and faltering pulse, and disposition to syncope. Death might be produced, I presume, in this case, ture are liable to take place in any form of organic cardiac disease. They result, it appears to me, directly from extreme irritability of the heart, brought on by working under the disadvantages of impaired organization. They may therefore be expected to flow, though less frequently, and in a form less severe, from excitement of the heart without organic disease; and this is frequently found to be the case. Pain in the cardiac region, palpitation, pain and numbness extending down the left arm, and affecting particularly the ulnar nerve, are features of daily occurrence, where organic disease certainly does not exist. Their recurrence may be prevented or mitigated by attending to the cause which may have produced them—whether over-exertion of mind or body—excess or incautiousness in diet—or plethora, requiring the occasional abstraction of blood.

In hysterical females, and perhaps generally in persons of a nervous temperament, these uneasy sensations are liable to be coupled with a symptom that at first gives the impression of organic mischief. A murmur is often distinctly heard attending the ventricular systole, conveying the idea that the aortic valves are diseased. But this murmur comes and goes, and whatever its cause, it is independent of any change of structure. The pulse at the time is quicker than natural, and jerking, and it is possible that a suddenness of expulsion of the blood through the aortic orifice may be sufficient to give rise to this sound. Dr. Hope is of opinion that in such cases something may be attributed to an attenuated state of the blood; and the experiments upon which he grounds this conjecture are extremely curious, and seem strongly to bear out his ideas. He found that if he subjected dogs to repeated bleedings, the heart became irritable, the pulse frequent and jerking, and the blood greatly attenuated: at the same time a systolic murmur became audible.

VI. *Malformations.* The following enumeration is given by Dr. Hope.

a. The heart single, like that of a fish, consisting of one auricle and one ventricle, from which springs a trunk that presently divides into the aorta and pulmonary artery.

[illegible] at its origin, [illegible] nearly [illegible] of the ventricles [illegible]

[illegible] septum deficient [illegible]

[illegible] septum deficient at the [illegible] a common opening into that [illegible]. The malformation is generally [illegible] the pulmonary artery, frequently [illegible] the foramen ovale, and occasionally [illegible] the pulmonary artery and [illegible] of [illegible].

[illegible] septum perforated towards [illegible] of the pulmonary [illegible] of the [illegible].

[illegible] Foramen ovale open, and pulmonary [illegible] ventricles, and giving off the descending [illegible] corresponding vessels in the usual way.

[illegible] arising from the right ventricle, [illegible] the foramen ovale, and [illegible] open.

[illegible] The septum [illegible] opening into the left [illegible] and the ventricles communicating [illegible] immediately below the aortic valves. [illegible].

The [illegible] resulting from [illegible] to the admixture of the black blood [illegible] munication is inconsiderable, no sensible result ensues from it. Free communication of the two sides of the heart is almost constantly accompanied with hypertrophy or dilatation of the right cavities, whereas the left are very rarely affected. This circumstance is probably attributable on the one hand to the direct force of the left cavity acting against the right—on the other hand, to the effort to maintain a vigorous pulmonary circulation.

SECTION V.

The Blood.

a. Causes that excite the circulation, make the blood slower of coagulating. By loss of blood, its tendency to coagulate is increased. Mr. Hewson, who ascertained this to be fact by observations on slaughtered animals, introduces the following remark, which is not without interest, as exemplifying the half perception of a principle, which generally precedes its true knowledge.

"I recollected," says Mr. Hewson, "a remark that I had heard, particularly from Dr. Hunter, which is—that *the faintness, which comes on after hemorrhages,* instead of alarming the bystanders, and making them support the patient by stimulating medicines, as spirits of hartshorn and cordials, *should be looked upon as salutary; as it seems to be the method nature takes to give the blood time to coagulate.*"

Loss of blood reduces the specific gravity of the blood in proportion to its frequency: the red particles and the fibrin are reproduced with more difficulty than the serum or the salts. The serum also becomes lighter from a gradual diminution of its solid contents. The blood sometimes loses its tendency to coagulate, and has the appearance of serum and red particles. Mr. Hewson describes a case of fever where the blood presented this character, but the patient dying a few days afterwards, coagula were found in the great vessels.

Mr. Jenkins, the blood contained 871 and 852 parts water, instead of 780 parts, the natural standard; and colouring matter 48.7 and 52, instead of 133. The albumen and salts were in the usual proportions.

d. Blood may be excessive in quantity, constituting plethora, whereby the circulating system is supplied more abundantly than is needed for the due performance of the functions of nutrition and secretion.

A tendency to accumulation in the capillaries and in the different internal organs is hence induced, and congestion with its consequences, or actual rupture of the blood-vessels, are liable to result. Drowsiness, vertigo, headach, epilepsy, apoplexy, mark this state as existing in the head; dyspnœa, and a livid or purple hue of the skin, as affecting the lungs; palpitation and irregular action, with syncope, mark the struggle of the overloaded heart to propel its contents.

Hemorrhages from the mucous membranes of the nose, the lungs, or the intestines, are often consequences of congestion of the vessels which ramify on their surface; while indigestion, torpor, and biliary redundancy, are connected with a plethoric condition of the abdominal viscera.

d. Inflammatory blood is characterized by a colourless *crust* or *size* upon the upper surface of the clot, which in the acutest inflammation is of the depth of a quarter to a third of an inch, and is strongly contracted or cupped.

The principal facts which are known upon this subject, were observed by Mr. Hewson. They are the following:—

1. In inflammatory blood the process of coagulation is slow, but the red particles begin to subside immediately, as may be seen in the blueish cast which the surface assumes, from which a transparent liquid can be taken that coagulates.

2. The subsidence of the red particles depends upon attenuation of the fibrin.

In two phials, one of inflammatory serum, one of uninflammatory serum, a teaspoonful of serum loaded with red particles (from uninflammatory blood) was poured. They subsided with equal slowness in both. Two teaspoonfuls, one of serum with red particles from inflammatory blood, one of serum with red particles from uninflammatory blood, were poured into two phials of uninflammatory serum. There was no difference in the time of the subsidence of each.

3. The disposition to form a size is capable of being modified in a very brief period, by the condition of the nervous system.

A young man of an athletic habit, was bled in an attack of inflammatory fever. Upon opening the vein, the blood flowed very slowly. The pulse in the other wrist was low, and he admitted that he had been afraid of the operation: it was four minutes before an ounce and a half could be drawn into another cup. The orifice was then stopt till a second cup was brought, into which three ounces were drawn in a full stream, in two minutes. A third cup was then substituted, into which the blood flowed in less than two minutes. By this time the patient began to be faint; the bleeding was stopt till he lay down on the floor, and then about three drachms more were received into a fourth cup; this came very slowly, and the bleeding stopt of itself. Upon this blood Mr. Hewson adds the following remarks:

"That which was taken away last was first coagulated, and completely too, by the time I had tied up his arm, which was in three minutes from the blood's first running into the cup.

"The blood which was received into the first cup coagulated next, and, as I observed by my watch, in twelve minutes from its being set down on the table.

"That which was received into the second cup was the third in order as to coagulation, and was considerably later in jellying than the first; for in fifteen minutes it was not thoroughly coagulated; nay, even in twenty-two minutes a small part of it was still fluid. It was remarkable that none of these three had any size.

"But the blood in the third cup differed considerably from that in the others; for in five minutes it began to appear transparent on its surface, an indication of a future size, and it was later in coagulating than that in the other cups; for even at the end of twenty-six minutes a great part of the coagulated lymph was still fluid, as appeared on removing the pellicle that covered it; but in thirty-five minutes it was completely jellied. The size in this blood was very thick and tough."

Milky serum. The oil or unctuous soft solid which is now ascertained to be one of the constituents of healthy blood, is liable to morbid increase under various forms of disease. Morgagni cites two cases of malignant fever in which the serum was milky. Hewson, besides enumerating instances to be met with in authors, gives three cases sent him by medical friends: one of amenorrhœa with dyspepsia and vicarious discharge of blood by vomit and stool; another of violent and continued epistaxis, and a third of dyspepsia with slight asthma. In all three cases there were symptoms of plethora; but milky serum is by no means necessarily connected with this state. The most marked instance that Dr. B. Babington has met with, was in a case of diabetes, where bleeding was several times repeated at long intervals, and on each occasion the same morbid condition of serum was observed. This was quite opaque, and nearly as white as milk; and on standing for a few hours, a film of matter resembling cream covered the surface. The clot could not be seen when it was scarcely a tenth of an inch beneath the surface. It had a firm, very thick, white coat of fibrin, and the red particles were almost diffluent beneath. The patient, a female, could not be called plethoric, having been the subject of her emaciating complaint more than a year and a half.

An instance, of which I have kept a note, is that of a gentleman who was seized in the night with feelings of nervous excitement and alarm, with a hurried circulation, proceeding from indigestion. I bled him to fourteen ounces; the blood exhibited a milky serum.

In disease of the kidney. In those organic diseases of the kidney which are characterized by anasarca, and the passing of urine coagulable by heat and acids, the albumen of the blood is more or less deficient in proportion; and this is marked by a corresponding diminution in the specific gravity of the serum. The two following instances are from notes of cases by Dr. G. H. Barlow, who has devoted much attention to the examination of the blood and urine in this disease.

From a patient affected with general anasarca—the urine was copious, clear, pale, coagulable by heat and nitric acid; specific gravity 1.011. Blood cupped and buffed, serum milky; specific gravity 1.019. The healthy specific gravity of serum 1.028.

From a man aged 48, affected with anasarca—the urine was a dingy brown; natural in quantity, and coagulable: specific gravity 1.003. Blood cupped and buffed: specific gravity of whole blood 1.037.

These notices are contained in an excellent account by Dr. Benjamin Babington, of the morbid condition of the blood, in the fifth number of Dr. Todd's Cyclopædia, from which having already largely borrowed, I likewise extract the fol- g.

In the cases of diseased kidney referred to, a result analogous to that which follows extirpation occurs; for while that organ is permitting albumen to pass through it unchanged, the urea which it should separate is very generally always found in the blood. This has been proved by Dr. B. Babington in repeated instances, and it is now so generally admitted from the experiments of Prout, Christison, and others, that it is scarcely worth while to cite cases. Dr. Bright, vol. ii, p. 447, alludes to several specimens of serum from patients under this disease, which were submitted to examination, in some of which urea was detected, in others not. In one very remarkable instance of a young woman, the albuminous state of whose urine constantly existed for above three years, the urine contained less than one-third of the normal proportion of urea, while about one per cent. of albumen supplied the deficiency. The serum of the blood was, as it has been already remarked to be usual in this disease, of very low specific gravity, being only 1.021. The quantity of albumen in 1,000 grains amounted, after careful drying, to only 50 grains instead of 78 (Lecanu's healthy standard), and it contained fully as much urea as the urine itself, the 1,000 grains yielding nearly 15 grains of that principle.

Diabetes. The blood in diabetes is remarkable for the length of time that it can resist putrefaction; but hitherto no other difference has been determined in its qualities from those of healthy blood. Dr. B. Babington remarks, with equal ingenuity and probability, that the failure of chemical analysis in this instance may result from *venous*, not arterial blood, having been used. The kidney may be vent enough for the abnormal ingredients.

Cholera. In the stage of collapse the blood is thick and dark, resembling treacle or tar. Specific gravity high; the serum varying from 1.040 to 1.045 at 60 Fahr.; the solid matter, according to M. Lecanu, double that of the healthy proportion. Cholera blood contains less water and more albumen and hæmatine than healthy blood, and its salts are in unusually small quantity, or almost entirely wanting. Dr. O'Shaugnessy detected urea in cholera blood.

Fever. In those fevers which arise from marsh miasmata or from contagion, it is an opinion held by Dr. Stevens, and supported at great length in his work on the blood, that a diseased condition of that fluid is the first in the train of symptoms which occur, and the immediate cause of those which follow. The blood itself, says Dr. Stevens, is both black and diseased even before the attack. During the cold stage it is very dark. When first drawn it has a peculiar smell, and coagulates almost invariably without any crust. There are black spots on the surface of the crassamentum; the coagulum is so soft that it can easily be separated by the fingers, and during its formation a large quantity of the black colouring matter falls to the bottom of the cup. In the hot stage it becomes more red, and, in some cases, it is even florid for a time, but during the remission it is darker in colour than the blood of health, and decidedly diseased in all its properties. In milder cases, the blood which is drawn may coagulate without a crust on its surface; but in the more severe forms of this fever, when the blood was drawn at an advanced period of the disease, a part of the albumen coagulated on the surface of the fibrin, and formed a diseased mass, which in appearance had a greater resemblance to oatmeal gruel than to blood drawn from a healthy person. The serum which separated was also diseased; it had a brownish colour, and in some cases an oily appearance, which is never met with in the clear serum of healthy blood. In the climate or seasoning fever of the West Indies, which is not considered contagious, but a fever of excitement, the blood drawn in the first stage flows from the vein with great

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[illegible] without any admixture of surface, and
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Such are the appearances which the blood
presents in [illegible] of the disease. In the
commencement or stage of depression the bl
very coagulates quickly, and forms a larg
fibrin [illegible]. In the stage of excitement [illegible]
becomes thinner and more florid, and the
Coagulation takes place more slowly, and
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fibrin, thus nearly resembling menstrual bloo
mixture of serum and red particles, already
often found in the larger vessels after death.
alterations which the blood usually undergoes
two stages of simple continued fever, but in th
malignant forms, as in typhus, the blood is generally
seen from the commencement. As the disease
gradually loses its power of coagulation, and in
severe [illegible] entirely deprived of fibrin.

Magendie has artificially produced an analog
blood by injecting putrid liquids into the veins
and the speedily fatal disease which he thus c
strong analogy with typhus fever.

been confirmed by Jennings, who in the interesting report already alluded to, gives an analysis of the blood in six cases of continued fever, in which the alkaline salts were found diminished in the following proportions:—

In healthy serum, according to Lecanu, salts	8.10
In the serum of a male, aged 31, first day of fever, salts	4
Ditto aged 34, first day of fever, salts	5
Ditto female, aged 14, fourth day of fever, salts	4.2
Average of three other cases	4.4

Jaundice. In jaundice the blood, both arterial and venous, is tinged with bile, and this is apparent not only in the serum, but still more strikingly in the crassamentum, provided it be covered with a buffed surface. If this be removed and dried in a state of tension, it exhibits a deep yellow hue, particularly when viewed by transmitted light. Although the bile is thus rendered very visible in jaundiced blood, yet, owing to its combination with albumen, which defends it from the action of acids, it is difficult of detection by chemical reagents, so that many chemists of eminence have sought in vain to ascertain its presence. Lassaigne, however, succeeded in demonstrating that the colouring matter of the bile is really to be found in the circulation, and Berzelius tells us that Collard and Martigny pretend to have discovered even the resin of bile in jaundiced blood. M. Lecanu has more recently confirmed these facts, and Mr. Kane has verified his results. To the medical inquirer who does not follow the minutiæ of animal chemistry, the identity of the colouring matter in the serum of jaundiced blood with that of the bile itself will be rendered sufficiently evident by adding to it an equal quantity of sulphuric acid diluted with twice its bulk of water. The serum will thus change its yellow hue for the characteristic green colour of acid bile. Experimentalists have failed in producing this effect, being probably misled by having found that the small proportion of acid which is required to strike a green colour with urine charged with bile, produces no such effect when added to jaundiced serum.

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pends upon a thin stratum of liquid intervening between the lungs and the walls of the chest. In that case the voice of the patient, when heard through the instrument, has a squeaking tone resembling that of Punch; or a shrill sharp tone seems vibrating upon the surface of the lung, echoing, or rather accompanying the voice of the patient. This sound is termed œgophony. It disappears as the quantity of fluid increases: at the same time the chest is dull on percussion, and the lung being compressed, respiration is totally extinguished in it. When in the ordinary process of recovery the liquid is in great part reabsorbed, the œgophony becomes again audible. At this period the affected side becomes less than the other; the lung being slower in expanding to its original size than the water in being absorbed.

Chronic inflammation of the pleura displays various features; or, under this head, several dissimilar affections have been grouped.

One of these is attended with the formation of a general layer of adherent lymph upon the pleura, and immense serous effusion, but is without the characteristic pain or fever of pleurisy. This affection existed, masked by other disease, in the case of tuberculous affection of the pancreas given at page 410.

A less effusion, with partial deposition of lymph depending upon partial inflammation, is of frequent occurrence.

Thickening of the pleura without adhesion [*u.* 93.], the membrane sometimes approaching cartilage in hardness and crispness, is another consequence of chronic inflammation. Phosphate of lime is sometimes deposited in pleuritic lymph.

Empyema. Suppuration in the pleura is less a consequence of chronic than of protracted acute inflammation. [*u.* 90.] This complaint may be surmised to exist, when the symptoms denoting pleuritic effusion, instead of gradually lessening, persist, the patient falling at the same time into hectic fever. In this case paracentesis thoracis is again necessary. In a boy, upon whom I performed that operation, for empyema ensuing upon fracture of the ribs, complete recovery followed: the discharge of matter slowly lessened; the parietes of the chest on the injured side sank down upon the compressed lung; the wound healed; respiration of the lung was re-established.

The following is a brief account of another case, at present under my care.

George Bussell, aged twenty-one, at eight became subject to epileptic fits. Four years ago the fits used to supervene every three weeks, or oftener. At that time the moxa was repeatedly applied by my advice behind each ear for a period of three months. The recurrence of the fits was suspended through this treatment for two years and upwards. During the last year the fits have returned. In one of them, which occurred about the beginning of August, as he was bathing in the Serpentine, he dropt under the water unobserved; but another bather happened to catch his foot against him, which led to his being taken out and resuscitated. His mind was not collected for forty-eight hours. The next day he felt pain in the left side on drawing his breath, with symptomatic fever, and disposition to lie on the left side. After a few days the pain declined in severity; but he continued confined to his bed for fourteen weeks, with dyspnœa, and profuse night sweats. He eat, however, heartily, dining on meat and porter.

At the time of his admission, November 11th, the left side was œdematous, and the chest was dull on percussion. No respiration was audible in the left lung. The heart beat on the right side, where he had observed it to beat since the first week of his illness. On the following day I punctured the side of this patient with a hydrocele trochar, between the fifth and sixth ribs, selecting this point from the peculiar tenderness on pressure there, and a suspicion that the sixth rib had been fractured, which however was not the case. Twenty ounces of matter were drawn away, and the wound was closed. The following day thirteen more were allowed to flow, and the wound was again closed. Three days after, twenty-eight ounces more were drawn, and a portion of elastic catheter was fastened in the wound. A few days afterwards the portion of catheter was removed, and the wound has continued fistulous. The discharge is still very profuse, and he is greatly emaciated. There is re-

Hospital, in which the breathing of one lung had been suppressed, and the pleura of that side was conjectured to be filled with solid substance, its cavity was found occupied by strata of coagulum, which had been deposited at different times from blood that had flowed from an intercostal artery ulcerated over a rough and carious rib.

Hydrothorax, like ascites, is rather an effect of disease, than a disease itself: it commonly results either from some obstruction to the circulation, or from attenuated blood and vascular atony. The symptoms are dyspnœa, orthopnœa, livid countenance, dulness of the chest on percussion.

Malignant disease. In a preparation presented by Dr. Chalmers, of Croydon, in which the lungs were the seat of fungus hæmatodes, both the pleuræ costalis and pulmonalis had given origin to masses of medullary sarcoma. [*u.* 100.]

In a patient who died in the Middlesex Hospital of cancer of the breast, the pleuræ pulmonalis and reflexa were studded with smooth, firm, white, circular, convex tubercles, from a line to half an inch in diameter. [*u.* 101. 102.]

SECTION II.

The Lungs.

Under the head of affections of the lungs, it is convenient to include those of the filamentous texture of the lungs, of the air-vessels, and of the smaller air tubes. Hypertrophy, atrophy, pneumonia, gangrene, pulmonary hemorrhage, œdema of the lungs, emphysema, phthisis, malignant tumours, hydatids of the lungs, are the subjects treated of in the present section.

I. *Hypertrophy.* When one lung is destroyed by disease, the other becomes hypertrophied, or grows, to serve its doubled function. The lung increasing in volume becomes firmer, more elastic, and more compact. In place of collapsing, when the chest is laid open, it sometimes protrudes from it, as if the space that contained it had been too small.

[illegible] of the three stages of pulmonary [illegible]:—

1. The lung [illegible] in health. [illegible]

2. [illegible] somewhat flattened.

3. In this stage the substance of the lung [illegible] it has acquired; [illegible] yellow points, [illegible] These points [illegible] yellow colour; and when [illegible] In this state the [illegible] has become more [illegible] and soft:

as is commonly the case in adults and old persons, both the pus and the pulmonary substance assume an ash-grey colour.

These different stages are frequently found in the same lung, dividing it into as many zones, that are strongly contrasted, although insensibly shading into one another.

The lower parts of the lungs are the most frequent seat of pneumonia; and when the disease involves the whole viscus, it is almost always in the inferior part that it commences. Such is the observation of Laennec, with which the impression of several of our most scientific London physicians concur. Dr. Forbes, however, in his valuable notes to his translation of Laennec's immortal work, brings a body of evidence from Andral and Cruveilhier, to show that the upper lobes are very frequently the seat of pneumonia.

The formation of abscess in the lungs, as a consequence of pneumonia, is of rare occurrence. [*u.* 60. 61.]

The lining membrane of the bronchi is commonly red, and occasionally swollen.

When near the surface, the first stage of pneumonia is recognized by a peculiar crepitation or crackling, as of salt thrown into the fire, resulting from the air bubbling through the liquid in the cells and minute bronchial tubes.

In the second stage, the chest over the inflamed lung is dull on percussion: no crepitation is heard; but the motion of the air and mucus in the large bronchi is distinctly audible, being conveyed through the solidified lung.

The disease is characterized by obtuse and deep-seated pain in the chest, quick respiration, dyspnœa, cough; the sputa are viscid, tenacious, glutinous, and contain some diffused shade of red, being either tawny or rusty.

An abscess of the lungs is attended with definite physical signs. When great part empty of fluid, it gives rise to pectoriloquy; or, in speaking (if the stethoscope is applied over the cavity), the voice seems to issue directly from the chest of the speaker. When air and liquid are present together, metallic tinkling or amphoric resonance is heard,—just as when air and liquid are mingled in the pleura.

The combination of pneumonia and pleurisy with large

verted into a putrid *deliquum;* and from these, when cut into, there flows a turbid sanies of a greenish grey colour, and of an insupportable gangrenous fetor.

The gangrenous affection occupies at least a great portion of one lobe, and occasionally the greatest part of one lung: it has no definite boundary. In some places pulmonary substance, altogether or nearly sound, blends insensibly with the gangrenous parts; in other instances these are separated by a portion of lung inflamed in the first degree, and in still rarer instances by a hepatized portion. If the disease is at all extensive, the progress of the symptoms is extremely rapid. The patient's strength is prostrate from the very beginning: the oppression becomes all at once extreme; the pulse is small, compressed, and frequent; the cough is rather frequent than strong; the expectoration is diffluent, of a very peculiar green colour, and exhaling an extreme fetor, precisely similar to that of a sphacelated limb. This expectoration is copious for a time, but soon ceases through loss of power, and the patient dies suffocated.

b. Circumscribed gangrene. Partial gangrene may occur in any part of the lungs. It exists in three different states; that of recent mortification or gangrenous eschar, that of deliquescent sphacelus, and that of an excavation produced by the softening and evacuation of the sphacelated spot.

When the sphacelated substance, of a dirty greenish-grey colour, occasionally bloody, and horribly fetid, separates and makes its way into the neighbouring bronchi, an ulcerated excavation is left, which for a long time retains something of the gangrenous character. Sometimes the gangrenous eschar, in a state of decomposition, makes its way through the pleura, and excites a pleurisy, usually accompanied by pneumothorax, either from the gas exhaled by the putrid eschar, or from a simultaneous communication with the bronchi.

Gangrene occasionally takes place of the walls of a tuberculous excavation.

V. *Pulmonary hemorrhage* may arise from rupture or ulceration of a vessel [*u.* 69.], or from an aneurism bursting into the lungs [*s.* 73.]: but these accidents are rare; and bleeding from the lungs commonly proceeds, like epistaxis or hemorrhage of the stomach, from exhalation or secretion of blood by the vessels of the mucous membrane. [a. 70.]

There are two varieties of pulmonary hemorrhage, which are comparatively of little moment, but which throw light upon the nature of this affection.

a. In mountains sufficiently elevated to occasion a considerable diminution of the atmospheric pressure, most persons spit blood. This arises from the pulmonary vessels being gorged with blood in consequence of the contraction of the air-cells, which follows upon the diminution of the force that naturally expands them.

b. In women, hæmoptysis is not unfrequently vicarious of the menstrual secretion, being the result of the entire or partial suppression of the latter. In this case, the complaint is but another mode of relieving the vascular system. As a general rule, therefore, hæmoptysis is a less alarming occurrence in women than in men. Dr. Clarke has remarked, that the application of leeches occasionally produces pulmonary hemorrhage. This observation is consistent with the fact, that the application of leeches in many women brings on uterine sanguinolent secretion.

The ordinary causes of pulmonary hemorrhage are, phthisis, and disease of the mitral valve of the heart.

c. Andral gives the following statement as the result of his own observations upon the connection of hæmoptysis with phthisis. Of the persons whom he had known to die of phthisis, one in six never spat blood at all. Three in six, or one half of the whole number, did not spit blood until the existence of tubercles in the lungs was already made certain by unequivocal symptoms. In the remaining two-sixths, the hæmoptysis preceded the other symptoms of tubercular disease, and seemed to mark the period of its commencement. Of those individuals whom Andral had known to spit blood at some period or other of their lives, there was only one in five whom he did not also know to have tubercular phthisis.

d. Disease of the mitral valve occasions a congested state of the pulmonary veins. Pulmonary hemorrhage is the mechanical relief and natural consequence of this condition of the pulmonary circulation.

e. In patients recovering ftom bronchitis, the sputa are not unfrequently streaked with blood.

f. Pulmonary hemorrhage sometimes takes place from none of the above causes. Andral relates the case of a young man, who suffered profuse hemorrhage from the lungs on four several occasions, between the age of twelve and eighteen, without any apparent detriment to his health, which remained excellent. I am acquainted with a gentleman, now forty-five years of age, and in perfect health, who fifteen years ago had two attacks of spitting of blood in one year: both seizures were preceded by a sense of constriction around the lower part of the chest. A year afterwards he spat blood a third time, in a violent fit of coughing excited by the smell of fresh paint. He has, I believe, neither pulmonary nor cardiac disease; and his only complaints are occasional indigestion and irregular action of the bowels, which he attributes to the vegetable diet which he adopted for several months after the spitting of blood. He is thin and spare, with a well-formed chest, and of a sanguineo-nervous temperament.

The blood of hæmoptysis is commonly florid, often frothy, sometimes clotted; the clot occasionally stringy and like fibrin, sometimes black.

The immediate danger attending pulmonary hemorrhage is twofold. On the one hand, the loss of blood may be so great as to destroy life: on the other hand, it may lead to an infiltration of the lungs with blood that may be followed by its own train of serious consequences.

Laennec observes, that he had known ten pounds of blood lost in forty-eight hours by a young man who died under the hemorrhage; and that, in cases of less acute character, he had seen about thirty pounds lost in a period of fifteen days. Hæmoptysis is often attended with vomiting of blood, that, when previously coughed up into the pharynx, had been swallowed.

The appearance produced by the infiltration of the lungs with blood is called pulmonary apoplexy: the discoloured

one of which consists in dilatation of the smaller air-tubes, the other in rupture of the pulmonary cells, and diffusion of the air through the interstitial cellular membrane.

a. Dilatation of the smaller air-tubes is liable to be produced by any cause which obstructs them. The ordinary cause is a glutinous secretion attending one or other of the forms of bronchial inflammation, which will afterwards be noticed. When the outlet of a lobule of the lung, as it often happens, is blocked up by a little pearl-like concretion of tough mucus, each expiratory effort in coughing compresses the vesicular structure, and strains the air-tube into which it opens; *both* are liable to be injured, the air-cells to become larger and irregular, the bronchial tube to be dilated. The enlargement of the air-cells and bronchial tubes takes place at the expense of the blood-vessels, which, being habitually compressed, some of them are obliterated, and most are contracted to less than their natural calibre. An emphysematous lung, when examined, appears to be less vascular than another: it is less crepitant, more elastic, and does not collapse. The surface is often irregular, from the dilatation or rupture of the vesicular structure having produced bullæ of different sizes immediately below the pleura. [*u.* 74. 75.]

When the circulation is tranquil, the atmosphere dry and of a moderate temperature, and bronchitis not present, the patient labouring under vesicular emphysema often breathes freely. But when any of these conditions are reversed, a paroxysm of embarrassed respiration, or asthma supervenes.

The sign of the disease obtained on percussion is, an unusually loud drum-like sound; — on auscultation, the absence of the ordinary vesicular murmur.

b. Interlobular emphysema is liable to be produced by the giving way of dilated air-passages. Or it may likewise be the result of rupture of the air-cells in healthy lungs through violent muscular exertion, as during labour: in the latter case, the air has been known to make its way into the cellular membrane of the neck and chest. This kind of emphysema disappears readily through the absorption of the air which has escaped.

which, when in the parenchyma of organs, are spherical from the equal pressure to which the effusion is subjected; when upon a surface, they are moulded to its shape.

When tuberculous matter has been secreted a certain length of time,—which varies from a few weeks to years,—it softens. The softening is the result of infiltration with liquid exuding from the part which contains the tubercle. The stage of softening leads to, or is produced by — at all events is accompanied by — inflammation and ulceration and suppuration. These actions, under favourable circumstances, are followed by restoration; the tuberculous matter being expelled, the ulcer contracts and heals.

Those in whom the tuberculous diathesis prevails, are often distinguishable by certain external signs. Either they are of a remarkably fair skin, the veins showing through it; the eyes blue; the upper lip full; the frame thin and delicate; the expression placid; the mind often unusually intelligent: the disposition touched with a high degree of sensibility and gentleness. Or they are of a dark and coarse complexion, the iris an opaque brown, the mind often dull and slow. Sometimes they exhibit a delicate dark skin and lucid eye, the sclerotic glistening and pearl-coloured.

In infants of the scrofulous diathesis, the digestion is weak, the skin harsh and dry, or subject to cold perspirations, particularly of the hands and feet; the nose is generally dry, or discharges thick mucus in large quantity; and epistaxis occasionally occurs. The eyelids are subject to chronic inflammation; and eruptions behind the ears and on the scalp, or other parts, are frequent.

The tuberculous deposit is most liable to attack particular organs at the following periods.

In infancy and early childhood it attacks the lymphatic glands, either the subcutaneous, and principally the cervical; or the mesenteric, producing tabes mesenterica; or the bronchial.

In more advanced boyhood, and after puberty till the age of twenty, and then in a diminishing ratio to the age of thirty, the cancellous structure of the round bones, and of certain of the flat bones already specified, and of the articular ends of

The other occasional attendant is the yellow jelly-like matter; the "infiltration tuberculeuse, gelatiniforme," of Laennec; who believes it to be only a more liquid state of the tuberculous matter poured into the parenchyma of the lungs.

The ordinary situation of tubercle is the upper part of the lungs; and the left lung is more commonly affected than the right.

I must refer the reader to Dr. Clark's scientific and practical Treatise on Consumption, for an account of the progress and symptoms of the disease, to which tubercles in the lungs give rise;—from the first period, when a slight diminution of strength, a pulse easily excited, occasional flushings, imperfect rest, slight but frequent cough, irritable mucous membrane of the bowels, first awake suspicion: and when on examining the chest, one side may sound duller on percussion than the other, and the voice may be more resonant on that side.—To the second period, when the figure has become emaciated, the cough more frequent, the frothy fluid which had been before expectorated colourless, now containing small specks of opaque curdy matter, of a pale yellowish colour, sometimes streaked with blood; the respiration hurried, the pulse frequent, with afternoon flushes and night sweats; the sound on percussion duller; crepitant rhoncus heard, and bronchophony; or even in one or more points of the clavicular, or scapular regions, pectoriloquy.—To the concluding stage, in which to an aggravation of the previous symptoms, dyspnœa threatening suffocation, distressing muscular pains about the chest, colliquative diarrhœa, close the scene.

IX. *Cysts, hydatids, and phosphate of lime-deposit,* are met with in the lungs.

X. *Medullary sarcoma and melanoma,* separately or together, are liable to form in masses in the lungs. In the case from which the specimen [*u.* 86.] was obtained, the only pulmonary symptom was frequent hæmoptysis. The lung is studded with spherical masses of medullary sarcoma.

which become red and slightly thick- firmer, sometimes softer than natural; at- sense of dryness or roughness behind the tending into one or both lungs; cough at ccompanied by a serous expectoration, which ghtly glutinous, but not distinguishable from which it is intermixed. As the disease ad- pectoration becomes thicker and more yel- ngled with particles of an opaque whitish rees the whole becomes opaque, of a pale y greenish hue, viscid, enclosing air-bubbles, what saltish, and occasionally marked with ecks of blood. When the sputa are very uently leave, after expectoration, a dull pain of the bronchi, indicating the place whence n detached. The cough occurs in fits, on meal, and on lying down to rest.

nd extent of the disease may be determined eceived through the stethoscope: at first, a ncus like the deep sound of snoring, or the ow over a large violoncello string; afterwards, ucous secretion increases, the sound of guggling

ular sound of the lungs is sometimes at one part the passage leading to it being plugged with en suddenly again audible.

he rhonchus exists in the whole of one lung, or in er part of both, the disease is always severe. When over the whole of both (which is the case only when upervenes upon severe idiopathic fever), death al- ays follows, except in very young subjects.

ronic bronchitis. Anatomically, the membrane more ly of a violet colour, and irregularly marked here e with spots of a paler or darker hue; while in the e red is brighter, and verging more towards purple t. The expectoration sometimes precisely similar to the latter stage of the acute; but most commonly inous, more opaque, and nearly puriform. Occa- it is of a dirty-greyish or greenish hue, from an admixture of the black pulmonary matter. It is usually inodorous; but sometimes becomes more or less fetid, and assumes the smell as well as the other physical qualities of the different kinds of pus.

This disease frequently follows acute bronchitis; and it is liable to persist, with remission, for years. During the remission, the appetite and strength return; but the patient commonly loses a little flesh, and remains paler than usual.

During repose, there is no oppression on the chest, but exercise soon brings on dyspnœa. The complaint remits in the summer, and returns in the winter, frequently attended with fever.

In some rare cases, hectic fever comes on, with rapid emaciation; and the disease terminates fatally with all the usual symptoms of phthisis pulmonalis. In fact, the most perfect similarity exists between the two diseases, as far as regards the expectoration, the emaciation, and all the other eral symptoms. Percussion, in this case, cannot remove the difficulty, as the chest sounds quite well in many consumptive patients. The indications afforded by the stethoscope are much more to be depended on. In such cases, if upon properly examining a patient at different hours, and for a certain length of time, we find neither pectoriloquy, nor the guggling produced by softened tubercles, nor the cavernous respiration of tuberculous excavations, nor the permanent absence of respiration in certain places from tuberculous indurations of some extent, we have a strong presumption that the disease is merely chronic catarrh; and if the same results uniformly present themselves after an attendance of some time (say two or three months), our presumption is converted into certainty. In these cases, the stethoscope gives no other signs than a mucous rhoncus; sometimes indeed pretty loud and abundant, but very rarely continuous, and still more rarely general over the chest. Very commonly we can hear distinctly the sound of respiration, notwithstanding the rhoncus; and there is hardly ever observed that total suspension of respiration which occurs in the acute disease, unless indeed there should happen to co- with the chronic a dry or pituitous catarrh, with innse congestion of some portion of the mucous membrane. even frequently happens, that the respiration becomes erile over nearly the whole lungs in these chronic ca- rrhs, while at the same time there exists a continued yspnœa, occasionally aggravated to violent paroxysms even a state of quietude. This constitutes the humid asthma practitioners.—*Forbes's translation of Laennec.*

c. Pituitous catarrh. The anatomical characters, a mid- ling degree of swelling, and a slight softening of the mucous embrane, with slight redness here and there. The expec- oration colourless, transparent, ropy, frothy on the surface, nd underneath like white of egg diluted with water. The hest sounds well on percussion: the sound of respiration is weaker during the fits of coughing than in the intervals: it s attended by a sonorous rhoncus, flat or sibilous, imitating the chirping of birds, the note of a violoncello, or the cooing of a wood-pigeon.

The disease may be either acute or chronic.

The acute is characterized by an extreme oppression, attended by copious pituitous expectoration. It sometimes begins as a common cold; but after a few hours, or even minutes, its severe character is declared by the violence of the cough, lividity of the face, coldness of the extremities, cerebral congestion. In children it is sometimes mistaken for croup. The attacks, however violent, are usually transient.

The chronic form is common in gouty subjects, when the gout has become less distinctly marked. Two elderly patients are mentioned by Laennec, one of whom, aged seventy, had expectorated during the last ten or twelve years, in two daily paroxysms, about four pounds of a colourless, ropy, and frothy fluid. Of two cases given by Andral, the one, an old man, was carried off after five months by the daily expectoration of about two pints of a serous fluid: the other, aged forty-five, died after bringing up three pints of the same kind every day during three successive years. In neither of these two cases was there found any other cause of death; and in the one last mentioned, the mucous membrane of the bronchi was found extremely pale.

Something similar occurs as a temporary feature during the resolution of peripneumony of the lungs.

d. Suffocative catarrh. The name given to bronchial inflammation, with large mucous secretion, that mechanically clogs the air-passages, and suffocates: common in elderly persons from cold, or after injuries of the chest; met with in adults and in children, and liable to be confounded with croup.

e. Dry catarrh. Anatomical characters: swelling, together with an obscure redness or violet hue of the mucous membrane; the swelling particularly remarkable in the smaller branches. Secretion glutinous, occurring in pearl-like globules, completely obstructing several of the smaller tubes. The chest resonant on percussion. No respiratory murmur.

This disease, when existing in a middling degree, frequently remains altogether latent for a long course of years, the subjects of it being only more short-breathed than others when they make any unusual bodily exertion. When the bronchial tumefaction becomes more extended, dyspnœa is then experienced even in a state of quietude, and particularly after meals. After a time the dyspnœa comes on in fits, which last usually several days, and obtain the name of *asthma*. It is presumable, that spasm of the muscular fibres of the small bronchial tubes contribute to the difficulty of breathing.

f. Hooping cough holds the middle place between the pituitous and mucous catarrh, as far as regards the nature of the expectoration and the bronchial congestion. The sonorous cough and crowing inspiration depend upon spasm of the glottis. The duration of the hooping cough is from a few weeks to several months. It seldom occurs twice in life.

III. *Ulcers* of the mucous membrane of the bronchi occasionally attend phthisis. Dr. Hastings, in describing chronic bronchitis, observes, " it is not uncommon to find this membrane ulcerated. This happens more particularly when the disease has arisen from the irritation of mechanical substances. The ulcers are always superficial, and generally small; but occasionally, in the larger bronchial cells, they are of considerable magnitude, and oblong or oval in shape. In the leather-dressers of Worcester, who have died of chronic bronchitis, the mucous membrane is always ulcerated."

IV. *Hemorrhage.* See Pulmonary Hemorrhage.

V. *Dilatation of the bronchi.* See Pulmonary Emphysema.

SECTION IV.

The Trachea.

The place of foreign bodies that slip through the larynx into the trachea, and are large enough to be detained in it, is discoverable by the pain or local uneasiness which they produce. They admit of removal by tracheotomy.

The affections of the trachea are, croup, chronic inflammation, small pox, ulcers.

I. *Croup.* An inflammation of the air-passages, in which the mucous membrane, of a deep vivid red, and slightly thickened, is lined with an exudation of coagulable lymph. The trachea is the principal seat of the most common form of the malady; which extends, however, over the inner surface of the larynx, and into the first division of the bronchi, only in diminished intensity. [*v.* 46.] It sometimes extends to the fauces and tonsils, and at other times is most severe in the bronchi. The false membrane, when coughed up, is reproduced, but in a less cohesive state. The disease combines two elements of danger,—fatal pyrexial action, and mechanical suffocation. The latter may, if necessary, be remedied by tracheotomy.

When the disease begins in the larynx, in its onset it frequently resembles a common cold; but after the lapse of some hours — sometimes only after one or two days — the cough becomes more violent, resounding in the larynx and trachea as in a metallic tube, and with a peculiarity of [illegible] compared to the crowing of a [illegible]

[illegible] exactly simulates this [illegible] inflammation confined [illegible] On the same co[illegible] the spasm and peculiar crow[illegible] depend.

[illegible] the trachea is a part of chro[illegible]

IV. [illegible] in the upper part of [illegible] and in the soft palate.

V. [illegible] seat of tracheal ulcers is the [illegible] from a few lines to [illegible] of a greyish dirty colour, co[illegible] edges somewhat swollen, [illegible]

[illegible] the trachea, from its origin to [illegible] was like a sieve, from an [illegible] so numerous and close [illegible] exceeded the sound [illegible] The disease had been attended [illegible] than pain in the tra[illegible] by a laryngeal hissing. [illegible] the oesophagus, but was [illegible] inconvenience than a little uneasi[illegible] swallowed.

[illegible] contracted by thick[illegible] inflammation, forming [illegible] consequence of the irrita[illegible] of a permanent opening [illegible] occurs a short distance [illegible]

SECTION V.

The Larynx.

The affections of the larynx derive importance from the effect of spasm of its muscles. The arytænoïds have in health the office of closing the larynx during deglutition. When disease or irritation of the larynx is present, these muscles are liable to close the opening of the tube suddenly, and keeping it closed to produce or threaten suffocation.

The affections of the larynx may be classed under the heads of spasm, inflammation, ulceration, polypi.

I. *Simple spasm* of the larynx is met with in the fits of children attended with crowing inspiration, in hysteria, in hydrophobia.

II. *Inflammations* about the larynx present four varieties.

a. Acute laryngitis, with effusion of croupy membrane or lymph on the mucous membrane, rapid prostration, suffocative seizures, death in two to four days. [*u.* 45.]

b. Erysipelatous inflammation of the mucous membrane of the epiglottis and lips of the glottis, with effusion of serum into the subjacent cellular membrane, producing œdematous narrowing of the opening, and spasm,—sometimes fatal in two or three hours.

c. Inflammation of a similar character but with less œdema; not alarming till suppuration is established below the mucous membrane.

In each of these cases, bronchotomy, or laryngotomy, are required to prevent immediate suffocation.

d. Subacute inflammation of the mucous membrane attends the latter stages of three cases out of four of phthisis, aggravating the cough and dyspnœa.

III. *Ulcers* of the larynx are of frequent occurrence, and are often combined with phthisis. Alone they constitute phthisis laryngea: they generally commence upon the

[illegible]

[illegible]

SECTION X.

Thyroid and Thymus Glands.

The diseases of the thyroid [illegible] tumors which contain a great variety of [illegible] [illegible]. The enlargement is called [illegible] [illegible] attacks young persons; girls [illegible] oftener than boys.

[illegible] hypertrophy the natural structure [illegible] remains normal and fibrous, its size increasing [illegible]. The gland often enlarges [illegible] g the bulk of either lateral lobe. It has appeared that this enlargement produces more dyspnœa and eal irritation than lateral enlargement.

tumour, when growing rapidly, is soft, and generally er on pressure.

The influence of one medicine on this complaint is remarkable. Iodine in general either permanently reduces the enlargement to a supportable size, or at all events temporarily diminishes it. When the disease makes head, if the isthmus alone is enlarged, the tumour admits of easy removal. I have once assisted at this operation, and once performed it myself. The best way to restrain the hemorrhage is to pass strong double ligatures on each side of the tumour which is to be removed, and tie them before cutting it out. I have never seen a case of lateral enlargement that required an operation to be performed.

The introduction of a seton, though in many cases successful, in some has proved fatal; the ligature of the thyreoïd arteries for this complaint is a pathological mistake.

The varieties of the disease are,

1. Serous or glairy cysts in the gland, which may be punctured and healed.

2. Tuberculous matter, which is likely to go into suppuration.

3. Cysts, containing blood. These cysts are sometimes of large size: one that I punctured continued to pour out blood profusely, and kept filling. The lancet opening, however, which I had made was closed without trouble by a compress and a piece of sticking-plaister. When a larger opening has been made, the cyst requires to be filled with lint, the pressure of which stops the bleeding, and excites inflammation and suppuration; after which the cyst granulates and closes.

d. Phosphate of lime deposit is frequent in bronchocele, as in all chronic fleshy growths.

The thymus gland I have once only seen diseased, when it was enlarged to a considerable size, and formed a mass with the adjacent lymphatic glands, infiltrated with tuberculous matter.

Hypertrophy takes place in those cases in which one kidney alone has been formed: the single kidney is of unusual magnitude, but of the normal shape. [*x*. 40.] Atrophy of the cortical substance is liable to be produced by any cause that mechanically obstructs the flow of the urine; the backward pressure of the urine in such cases upon the pelvis and infundibula of the kidney, produces dilatation, and a wonderful expansion of the cortical substance, which gradually spreads into a thin loculated membranous sac. [*x*. 42. 43.] It occasionally happens, when the kidney has been for some time expanded into a membranous sac, through a calculus obstructing the pelvis, and the calculus is not got rid of in any way, that after a time, the urine which distends the kidney is absorbed; the membranous sac at the same time wastes and shrinks, and is finally reduced to a mere capsule containing the stone.

2. *Anæmia*, or paleness of the kidney, and *hyperæmia*, or a dark and loaded state of the vessels, attended in extreme cases with spots of extravasation, are common appearances.

3. *Acute inflammation.* I have never had an opportunity of seeing the appearance which this disease presents upon a post mortem inspection. It rarely terminates fatally. Increased vascularity, with softening and brittleness of texture, would, I suppose, characterize it. The symptoms are fever, vomiting, pain in the loins, colicky pains of the belly, the urine scanty, the bladder irritable.

4. One of the most important varieties of *chronic inflammation* was discovered, and its true pathological value determined, by Dr. Bright, in whose reports the practitioner may see faithful delineations of the different stages of the complaint. The cortical part of the kidney at first mottled with interstitial deposit of fibrin; then indurated and granulated from the consolidation of the renal lobuli; and finally, entirely converted into a yellowish white seemingly homogeneous substance—form the progressive steps of the morbid alteration.

5. *Abscess of the kidney* is ordinarily the result of protracted *common* inflammation, originating in whatever cause. It is however most frequently a secondary consequence of

mechanical or sympathetic irritation, propagated reflectively from the bladder. Dr. G. H. Barlow mentioned to me a case that he had witnessed, in which the ureters of both kidneys were obstructed through lithic acid calculi. One kidney adhered to the colon, and communicated with its cavity by an ulcerated aperture. A lady mentioned by Sir Benjamin Brodie, had frequent desire to void the urine, and complained of a cutting pain at the neck of the bladder; the urine contained a muco-purulent secretion; afterwards true pus. Things had gone on thus for two or three years, when the patient, with the usual symptoms, passed a large renal calculus, and the original symptoms were relieved. Abscesses of the kidney depending on calculi, have pointed in the loins, and when the calculi have been discharged, have closed.

6. *Serous cysts.* Small cysts containing a transparent liquid are common in the kidney [x. 451]. Their growth is supposed to be slow, and they generally produce no derangement of the function of the gland: they have been termed spurious hydatids, in contradistinction to true hydatids, which form in, and are occasionally discharged in great numbers with the urine; the patient sometimes recovering. I shall quote two unusual cases of renal cysts: the first communicated to the Medical and Chirurgical Society, by Mr. Cæsar Hawkins, and remarkable for its rapid formation: the second, which is described in Sir Benjamin Brodie's Lectures on the Urinary Organs, exemplifies likewise subacute inflammation [of the mucous tissue ?] of the kidney.

A child, six years of age, was struck down and run over in the street, which caused considerable swelling of the belly and pain: these symptoms subsided in a few days. The accident occurred at the end of September, 1832. Four or five days afterwards the swelling returned; it was now confined to the right side: the child suffered from feverishness, and became emaciated. The swelling, which in a short time was determined to contain fluid, diminished temporarily with calomel. It then increased anew, with marked change for the worse in the child's health. On the first of December the cyst was punctured through the abdominal muscles, when eighteen ounces of clear fluid were drawn off, with relief to the child: the fluid was nearly transparent, and evaporated almost entirely, leaving a small residuum of muco-extractive matter, without any trace of albumen. The cyst filled again, and the child sank, and died on the 25th. The tumour was found to consist of a single cyst, which held four pints of fluid, the greater part clear and transparent, the remainder contained a good deal of white semi-purulent matter. The tumour reached upwards to the loin, raising the ribs and pushing the liver towards the left side and into the chest: downwards the cyst had protruded slightly below Poupart's ligament, through the femoral ring. The cyst appeared to have formed on the surface of the kidney.—*Cæsar Hawkins.*

A gentleman, in November, 1833, complained of voiding his urine frequently, and in quantities varying from an ounce to an ounce and a half. Always after making water he had a severe pain lasting a few minutes, and extending along the course of the urethra. The urine was pale, semi-opaque, of an acid quality, and when tested with heat and nitric acid, it was found to be highly albuminous. Occasionally small masses of a substance resembling coagulating lymph were found floating in it. He made no complaint of pain in the loins; he was able to empty his bladder by his own efforts, and the urethra was free from stricture. There was no calculus in the bladder, nor had sand or gravel ever been observed in the urine. These symptoms had begun to exist in the preceding February, since which time they had gradually increased. For a short time during the month of March the urine had been tinged with blood. In addition to these local ailments, the general health was much impaired: the patient had lost flesh, was languid, dejected, and of a pallid countenance. Soon afterwards the urine became again tinged with blood, the bodily powers continued to fail, and the local symptoms became more urgent. There was a total loss of inclination for food, the extremities became cold, the pulse feeble, and he died at the end of February, 1834.

Inspection.—The kidneys were found to be of a dark colour from excessive vascularity, and of a soft and somewhat brittle consistence; the distinction between the cortical and tubular portions being less marked than under ordinary circumstances. The investing membrane of the kidney had a very slight adhesion to the kidney itself, but it adhered very closely to the adipose substance of the loins. On the surface of each kidney, and partly imbedded in its substance, were four or five membranous cysts, each of the size of a large pea; and in one of them there was a similar cyst, but as large as a nutmeg, completely imbedded in the cortical substance. The pelvis, infundibula, and ureters were not more capacious than under ordinary circumstances: but on their being slit up, their internal surface presented the appearance of considerable inflammation.—*Brodie.*

7. *Tuberculous disease,* occurs in two forms; in one the tuberculous matter is deposited in spherical masses in the cortical substance of the kidney [*x*..50.]; in the other it lines as an exudation the mucous surface of the infundibula, pelvis, and ureter, and is commonly combined with dilatation of the cavities of the kidney and expansion of its cortical substance. [*x*. 51.]

8. *Fungus hæmatodes* of the kidney is unfrequent. The gland affected enlarges indefinitely; hæmaturia is generally present. The countenance in the latter stages exhibits the striking expression which inward malignant disease usually gives rise to.

9. *Calculi* in the kidney are found either as small fragments impacted in the tubuli uriniferi, or part in a tubulus part projecting into an infundibulum, or as larger masses free, or by their figure fixed in the infundibula, or in the branches of the pelvis, or in accidental dilatations of the cavities. [*x*. 60. 61.]

In diseases of other organs, the local or sympathetic pain, and the attendant fever, are the prominent symptoms: but all diseases of the kidneys are liable, while many are certain, to produce pain in the loins, in the course of the ureters, and in the bladder, in the spermatic cord and testis; and fever without diagnostic local symptoms is of little use to the pathologist.

One striking relation of renal disease has, however, been observed and recently described by Mr. Stanley, in the 18th volume of the Medico-Chirurgical Transactions, which although not often in activity, deserves from its importance full illustration.

A man was admitted into St. Bartholomew's Hospital, with paraplegia and retention of urine. On examining the spine, tenderness was discovered at the third lumbar vertebra; an issue was applied, and considerable improvement followed. Afterwards the general health failed, and the patient gradually sank. No disease could be discovered in the vertebral column; the bones, fibro-cartilages, spinal cord, and nerves were perfectly sound, as were the brain and its membranes. In one kidney there were numerous small abscesses. The other kidney was gorged with blood, and its substance was softer than natural. The mucous lining of the ureters and of the bladder was very vascular; and the muscular coat of the bladder was thickened.

A man, aged thirty-five, had partial loss of motion in his upper and lower limbs, which had commenced a month previously, and was supposed to originate in disease of the cervical vertebræ. He suffered besides from irritation in the bladder, with occasional inability to expel the urine, which was mixed with some puriform fluid. His health declined, and he died in six weeks. Both kidneys were found gorged with blood. In the substance of one kidney there were small depositions of pus. The muscular coat of the bladder was thickened, and its mucous coat very vascular. No morbid appearance was discovered in the brain or spinal cord. The vertebræ and fibro-cartilages were perfectly healthy.

Two cases are then mentioned by Mr. Stanley, in which similar conjoint affections of the spine and kidneys occurred after injuries of the back.

The explanation, which it would have been natural to offer of these concurrent phenomena, is, that in the latter case, the injury of the back, in the former, some nervous affection of the spinal marrow, determined simultaneously both results, the paraplegic affection, namely, and the renal disease; but other cases follow in Mr. Stanley's paper, which appear to me completely to establish the justness of his conclusion, that renal disease may cause paraplegia.

It is in alterations of the quantity and quality of the urine, that the symptoms are found which are our guides in measuring the extent and the kind of renal lesion or disease. The phenomena of this description may be arranged under the following heads,—suppression, excessive secretion, hæmaturia, albuminous urine, excess of urea, diabetes, amorphous sediments, gravel, renal calculi.

1. *Suppression of urine* may be complete or incomplete—that is to say, the secretion may not take place at all (or to the quantity of a table spoonful only in twenty-four hours); or the secretion may be less than the natural quantity by half or two-thirds only.

Complete suppression of urine may result from various causes.

a. From the prostration of the vital forces which attends Asiatic cholera.

b. From acute inflammation of both kidneys, of which it forms a symptom.

c. From obstruction to the discharge of the urine already secreted; which obstruction acts either mechanically or by sympathy.

A gentleman, aged sixty-four, who had been subject to the formation of renal calculi, which had afterwards come away by the urethra, was seized with one of his usual attacks, indicating that a calculus had escaped from the kidney. Instead, however, of terminating in the usual manner, the pain continued unaltered, and he ceased to void his urine. In the supposition that there might be urine in the bladder, the catheter was introduced several times, but no urine flowed. The patient became comatose, and died in a fit of convulsion eleven or twelve days after the commencement of the attack.

On examining the body after death, no urine was found in the bladder. In one kidney there were several calculi; there were none in the other. In the ureter belonging to the latter, and in the upper part of that canal, a calculus of the size of a horsebean was wedged. It appeared, therefore, that the circumstance of one ureter being completely

Diminution of the secretion of urine is common during urethral retention, the cause of which must be partly mechanical; and in dropsy, when it may be either a cause or an effect of the serous effusion.

2. *Excessive secretion.* In hysteria the urine is often large in quantity, pale, of a low specific gravity, and contains a large proportion of saline ingredients.

Sir Benjamin Brodie mentions an instance in which he examined the kidneys after death, where for some years there had been a large flow of urine of a pale straw colour. Both kidneys were of a very pale colour; the glandular structure of one of them was much diminished in bulk, the pelvis being at the same time considerably dilated.

3. *Hæmaturia.* The existence of blood in the urine is undoubted when coagula are voided with it, or when being of a dark colour its expulsion is followed by drops of pure blood.

Blood uniformly diffused through the urine, imparts to it either a bright red or a brown, or nearly black colour: its presence may be decided by adding water to the urine, and placing the diluted fluid in a tall glass vessel, when the colouring matter of the blood subsides to the bottom — or by boiling it, when a brown coagulum is obtained, and the rest of the liquid regains the natural colour of urine.

The blood in hæmaturia may proceed either from the kidneys, the ureters, the bladder, the prostate, or the urethra.

a. Blood from the kidney may pass in clots, or uniformly diffused through the urine.

The first is generally the result of hemorrhage from a mechanical cause.

When there are calculi in the kidney, rupture of a vessel or vessels may be produced by any sudden jolt: the blood that passes in that case occasionally comes away in the shape of worm-like coagula, which have been shaped in the infundibula or ureters. These are sometimes externally grey, like fibrin, and internally red, like a recent clot. Cullen states, that he had sometimes observed the blood come away in an almost dry state, resembling the half-burnt wick of a candle. I once found a black charred mass shaped to a part of the pelvis of the kidney contained in that cavity; it was extremely light; it was laid aside for more careful examination, and lost.

A blow upon the loins is liable to rupture the kidney to a greater or less extent, producing bloody urine: the kidney may even be injured by pressure from the fore part of the belly.

Ann Sullivan, aged twenty-five, was admitted into the Middlesex Hospital in February 1836, having been pinned by the shaft of a rubbish cart against a railing. She was retained in that position nearly a minute: the pain was severe, and she vomited. The belly was bruised to the left of the umbilicus, and tender on pressure. She was directed to be kept perfectly still, and without food, in the apprehension that the intestines might be ruptured; in the afternoon sixteen ounces of blood were taken from the arm. This blood drawn nine hours after the injury was of the colour of arterial blood. On passing urine in the evening, there was no pain, but the urine contained two small clots of blood: the urine voided afterwards was natural in appearance. For several days great tenderness remained at the left side of the belly and left loin, which, under the usual treatment, gradually went away.

Blood, however, from the kidneys, when proceeding from a mechanical cause, more often forms a liquid mixture with the urine. In that case, Dr. Prout observes, that it is generally equally diffused through the whole urine.

The most frequent cause of renal hæmaturia is the presence of renal calculi, which often exist without causing any other symptom; the rarest cause, malignant disease of the kidney, in which case Dr. Prout has noticed the presence of a peculiar and characteristic reddish sediment. It has been already shown that mechanical injury will produce renal hemorrhage. In inflammation, or in vascular congestion of the kidney, blood is liable to be poured out by exhalation.

The varieties of the latter case are periodical and vicarious hæmaturia, which are stated to have occurred.

The exhalation of blood in the kidneys is sometimes attended with shivering.

A patient under the care of Dr. Watson, in the Middlesex Hospital, had hæmaturia of an obscure kind; the discharge of blood was always marked by a smart rigor. Dr. Prout mentions an instance of obstinate hæmaturia, in which the bleeding was constantly preceded by a shaking fit. Dr. Elliotson gives an account of a case of intermittent hæmaturia, in a patient who had formerly had the Walcheren fever. He was admitted into St. Thomas's Hospital with ague, and he discharged from the urethra every time the cold fit came on a quantity of pure blood. He was cured by quinine, losing the cold fit and the hæmaturia together.

The origin of hæmaturia in the kidney is rendered probable by the presence of pain in one loin, and by the absence of those symptoms which indicate disease in the other parts of the urinary apparatus.

b. Hemorrhage from the ureters occurs in consequence of laceration of the lining membrane by the passage of gravel or calculi.

c. Vesical hemorrhage. Dr. Prout observes, that when blood is derived from the bladder, it for the most part comes away at the termination only of the urinary discharge, the urine having previously flowed off nearly pure. If poured out in any quantity, it is likely to clot in the bladder, and form a coagulum, which will take several days to loosen and be discharged with the urine. Mr. Howship mentions a case which occurred to Mr. Heaviside, of an old East Indian, who died after what was thought to be retention of urine, but no urine had flowed on the introduction of the catheter. The bladder was found distended by a very large coagulum of blood, which had come from the diseased mucous membrane.

M. Renault describes an obstinate hæmaturia, which affected numbers of the French troops in Egypt, and particularly the cavalry. It was attended with pain in the bladder, extending along the urethra to the extremity of the glans penis, and with frequent urgency to make water. The last drops excreted were frequently of pure blood. M. Renault had opportunities of examining the bladder, and found its inner membrane inflamed.

d. Prostatic hemorrhage is generally small in quantity, but sometimes it is abundant and alarming. A gentleman laboured under disease of the prostate: he was in the habit of introducing the catheter himself. One evening he observed that blood flowed with the urine. In the night Sir Benjamin Brodie found him with the bladder enormously distended, prominent in the abdomen as high as the navel, and blood still flowing from the urethra. A large catheter was introduced, but no urine escaped: the bladder was distended, not with urine but with blood. The patient was directed to lose blood, by cupping on the loins, and to remain quiet: under this treatment the hemorrhage ceased—not, however, until a very large quantity of blood had been lost. The catheter was afterwards introduced three or four times daily. The blood by degrees became dissolved in the urine, and after two or three weeks the latter was as clear as it had been before the attack of hemorrhage took place. But the pulse was frequent, the skin hot, the tongue dry and brown, and the patient survived the hemorrhage only a month. In the post mortem examination, the mucous membrane of the bladder was found extensively inflamed; a large tumour of the prostate projected into the bladder; and the exact spot seemed to be discernible at which the vessels of the tumour had given way, and from which the hemorrhage had proceeded.

e. Urethral hemorrhage. A young man came to the Middlesex Hospital, with hemorrhage from the urethra, and said that he had lost a considerable quantity of blood in this manner in the course of a few hours, in consequence of excessive indulgence in sexual intercourse the preceding night. The bleeding was permanently arrested by the introduction of a bougie, which was allowed to remain a short time in the urethra.

4. *Albuminous urine.* Albumen is contained in scarcely appreciable quantities in healthy urine, but in some states of disease it appears in considerable proportions.

The best mode of detecting its presence is the application of heat, and the addition of nitric acid. When the urine upon being heated to the boiling point is rendered opaque by a white precipitate, which is not redissolved by the addition of nitric acid, the presence of albumen may be certainly inferred. The addition of the nitric acid is, however, a necessary precaution, as specimens of urine are not unfrequently to be met with, which, upon being boiled, give a white flocculent precipitate closely resembling albumen, but which is proved not to be that substance, by its being immediately redissolved upon the addition of a few drops of nitric acid. There can be little doubt that the use of heat alone, as a test, has given rise to much error upon this subject.

Of those specimens of urine which are rendered turbid by heat, it is probable that not much more than one-half contain albumen. The cause of this phenomenon is at present involved in some obscurity; it appears in many cases to depend upon the precipitation of the phosphates, caused by the ammonia generated by the decomposition of the urea through heat, as stated by Dr. Bright, on the authority of Mr. Rees, in the Gulstonian Lectures for 1833. There are, however, cases to which this solution of the difficulty will not apply.

But further experiments are wanting upon the subject. Albuminous urine is of light specific gravity, seldom exceeding 1.015: Dr. G. H. Barlow has met with one or two specimens in which its specific gravity has been 1.005. This circumstance, which appears to depend upon a deficiency of urea, is perhaps of no less importance in the etiology of the diseases which have been observed in connection with albuminous urine than is the presence of the albumen itself. The mode which Dr. Prout uses to estimate the proportion of urea, is to put a little of the urine into a watch-glass, and add to it carefully nearly an equal quantity of pure nitric acid, in such a manner that the acid shall subside to the lower part of the glass. Healthy urine yields crystals of nitrate of urea after an interval of two hours; but Dr. G. H. Barlow has examined specimens of albuminous urine, which, even when concentrated by gentle evaporation to one-fourth of their bulk, yielded scarcely any crystals at the end of that time.

It was remarked by Dr. Blackall, that albuminous urine is characteristic of certain kinds of dropsy accompanied with inflammatory symptoms; and that physician expressed his belief that these symptoms had their origin in inflammation of some internal organ. It was, however, reserved for Dr. Bright to ascertain the seat of the disease. According to his observations, albuminous urine is accompanied by certain forms of disease of the kidneys which have been already adverted to, of which it may be considered a diagnostic symptom; which disease, on the other hand, is productive of dropsical effusions, of hypertrophy of the left ventricle of the heart, of inflammation of the serous membranes, and of apoplexy.

5. *Excess of urea.* The deficiency of urea has been shown to be an important circumstance in those cases of disease of the kidneys, which have been adverted to under the head of albuminous urine. There is, however, a disease noticed by Dr. Prout, as characterized by an excess of that substance. This derangement of the urine has not as yet been connected with any organic disease; and there appears to be a considerable want of uniformity in its nature, though the symptoms have in several cases closely resembled those of diabetes, in which Dr. Prout believes, that, if it be checked, it will eventually terminate. In these cases the urine is very abundant; and characterized by its great specific gravity, and the readiness with which it crystallizes upon the addition of nitric acid.

6. *Diabetes.* This term is restricted, by Dr. Prout, to disease in which a *saccharine* state of the urine is the characteristic symptom.

Diabetic urine is almost always of a pale straw or greenish colour. Its smell is commonly faint and peculiar, sometimes resembling sweet whey or milk. Its taste is always decidedly saccharine in a greater or less degree. Its specific gravity has been stated to vary from 1.020 to 1.050. Dr. Prout has seen it higher than this, but never so low. The quantity of urea, according to Dr. Prout, is almost always very much diminished: it contains, for the most part, little or no lithic acid. The usual saline matters existing in healthy urine are met with in diabetic urine in nearly the same relative proportions, but their absolute quantity is very much diminished. Sometimes diabetic urine contains a little blood; and, not unfrequently, albuminous matter analogous to that of chyle.

Diabetes is ordinarily connected with diuresis. Cases are on record, in which the enormous quantity of thirty pints has been discharged every twenty-four hours for weeks and even months together. The quantity of saccharine matter contained in diabetic urine is not less surprising. From a table calculated by Dr. Henry, it appears that ten pints of diuretic urine, of the specific gravity of 1.040, contain upwards of a pound and a quarter of solid extract.

The constitutional and other affections usually accompanying a saccharine state of the urine are summarily enumerated by Mr. Watt as follows:—

The appetite usually better than in health; uneasiness in the stomach after meals; thirst urgent; the mouth dry and parched; tongue white and foul, sometimes unnaturally clean and red; tough disagreeable mucus in the throat; depraved taste; skin dry and unperspirable; considerable emaciation; weariness and aversion to exercise; loss of strength; pain and weakness in the region of the kidneys; irregular, generally costive, state of the bowels; some degree of inflammation and uneasiness about the external orifice of urethra; loss of virility; chilly state of body; cold feet; tendency to œdema; heat and uneasiness in stomach and bowels; acid eructations; flatulence; eyes muddy and painful; indistinct vision; vertigo; headach; dyspnœa on the least exertion; gums spongy and ulcerated; weight and tenderness about the præcordia; listlessness; mind weak and peevish; spirits exhausted. The breath, and frequently the person of the patient exhales a peculiar hay-like smell. The pulse variable, but generally in the latter stages weak, and sometimes irregular.

The proximate cause of this disease is unknown. It is occasionally combined with tubercles in the lungs. Its source probably lies in disorder either of the digestive organs,

[illegible] of health, [illegible]
[illegible] health or slight[illegible]
[illegible] health or [illegible]
[illegible] and the like.

[illegible] sediments vary
[illegible] they are with [illegible]
[illegible] a deep brick [illegible]
[illegible] of ammonia, [illegible]
[illegible] proportion of the [illegible]
[illegible] of the purp[illegible]
[illegible] When the purpurate exist
[illegible] Prout, however, the [illegible]
[illegible] or inflammatory
[illegible] The law is in general
[illegible] symptom [illegible]
[illegible] fever; and [illegible]
[illegible] however [illegible]
[illegible] and declining; [illegible]
[illegible] in the [illegible] stage.

[illegible] These sediments consist of the lith[illegible]
[illegible] purpurate only, the colouri[illegible]
[illegible] gives the lateritious its yel[illegible]
[illegible] fever of an irritable
The most perfect specimens which Dr. P[illegible]
[illegible] sediments were obtained from the liver
[illegible] they are produced in certain chronic

white lithate of soda were deposited from the urine. In one case in particular, the quantity was immense; and voided not only mixed with the urine, but in a state of consistency like mortar, especially during the night, so as to produce considerable difficulty in passing the urine.

8. *Gravel.* The urine under different circumstances deposits a red sand and a white.

a. Red sand. Healthy urine turns litmus paper red. This effect, according to Dr. Prout, is not produced by a free acid, but by the lithate of ammonia. But another acid (the muriatic, according to Dr. Prout) may be formed in the urine, which will decompose the lithate of ammonia, combining with the ammonia, and throwing down the lithic acid. The red sand is lithic acid. When the urine contains superabundant acid, it is usually bright and transparent, and of a copper colour, or resembles Madeira wine.

Lithic acid gravel is formed in a sthenic habit, the result of stimulating food not qualified by exercise and free perspiration. It occurs in the gouty diathesis, combined with lithate of soda deposit about the joints, and psoriasis of the skin. Alkaline medicines, temperance, exercise, the sulphur-bath, correct it.

b. White sand. The urine, under ordinary circumstances, contains in solution the phosphate of magnesia, a highly soluble salt. But according to Dr. Prout, in some cases of disease the urea becomes decomposed in the kidneys, and ammonia is evolved, which combines with the phosphate of magnesia so as to make a triple salt. But the triple salt is insoluble, and therefore is precipitated in the form of a white sand. Dr. Prout observes also, that the same state of the system which leads to the decomposition of urea and the evolution of ammonia, leads also to a more abundant formation of the phosphate of magnesia; and hence arises the immense deposition of white sand which occurs in some cases.

The white sand, which the triple phosphate constitutes, in general marks an asthenic habit: the system has been lowered, and must be strengthened; the alkaline quality corrected by the use of the mineral or vegetable acids. But sometimes other causes will produce the same diathesis. The urine in this case is alkaline, of a pale colour like whey; the odour remarkably unpleasant, sometimes ammoniacal.

Certain symptoms of a mechanical origin are common to both kinds of gravel: pain in the loins, pain in the course of the ureters and in the testis, pain down the thighs, irritability of the bladder; but the extent and even the existence of these symptoms are capricious.

Phosphate of lime is met with in the urine, either with or without the triple phosphate. A small quantity of this salt seems to be occasionally generated by a diseased kidney; but in general it is derived from another source.

9. *Renal calculi* are the resul f the same diathesis, and consist for the most part of th me chemical elements as gravel. Calculi are thus formed of lithic acid, or of the triple phosphate, or of the two succession. The cause why at one time gravel is formed. t another calculus, is to be sought in the presence or absei of an additional element, some glutinous substance secreted with the salt, which when present joins the crystals into a coherent mass.

The lithic acid, or the triple phosphate, may form indifferently calculi or sand: on the other hand, another salt, the oxalate of lime, never appears as sand, but comes away in small or large concrete masses.

a. The commonest variety of calculus is that which is composed of pure lithic acid. These are generally of a round or oval form, of a light brown colour, and commonly smooth on the surface.

b. The next in order of frequency are those composed of oxalate of lime. These are of a dark colour, and usually of an irregular figure, with a number of small prominences on the surface; having something of the appearance of a mulberry, and hence denominated mulberry calculi.

c. The triple phosphate of ammonia and magnesia is sometimes but rarely deposited in the kidney, so that it may form the nucleus of a calculus. The triple phosphate is commonly found as an external layer (separated from the urea in the bladder) upon a nucleus either of lithic acid or of oxalate of lime.

d. Calculi of phosphate of lime are occasionally found in a diseased kidney, probably not proceeding from the urine, but from other secretions of the affected organ. In the collection belonging to Sir Benjamin Brodie, there are two kidneys completely filled with calculi of this description.

Calculi may form in the kidney, and exist unsuspected for an indefinite length of time; or they may produce hemorrhage, or inflammation, or abscess, with or without obstruction to the flow of urine from the affected kidney; with or without pain in the loins, pain in the ureters and bladder, fever, and extenuation.

SECTION II.

The Ureters.

The ureters are liable to participate either in inflammation, or in tuberculous action originating in the kidney: they are liable to become enlarged from distension with urine, alone, or mixed with pus, in consequence of obstruction either from inflammatory stricture following irritation, or from calculi filling and being stopped in their cavities. In general, calculi that cannot pass are arrested at the upper part of the canal [*x.* 70]; but it has happened that a calculus has stuck in the vesical termination of the ureter, and has produced fatal disease of the kidney, when a fortunate movement of a sound in the bladder might have displaced it. The ureters will bear, or will grow to, a wonderful degree of dilatation, so as to attain a diameter of three-quarters of an inch, in consequence of stricture of the urethra. Sometimes when the ureter has been long distended with a calculus, an abscess has formed in the loins, the ureter has ulcerated, and the calculus has passed by the opening. [*x.* 71.]

The principal affections of the ureter are thus dependent upon the passage of calculi. Even sand in passing generally produces some disturbance; pain is felt in the loins, and in the course of the ureter. But the progress of a calculus causes more severe distress.

But this rule has its exceptions. The following case, which is one, exemplifies at the same time the effect of accidental concussion in placing a pelvic calculus in such a position against the commencement of the ureter as to lead to its expulsion by that canal.

A gentleman somewhat advanced in years, who had observed occasionally that his urine was tinged with blood, was overturned in a carriage, and severely jolted. When, after the delay which this necessarily occasioned, he reached home, he found his bladder much distended, and experienced a violent desire to void his urine. On his making the attempt, however, no urine flowed, there being evidently a mechanical impediment. He strained and strained, and at last the impediment gave way. A renal calculus, which seemed to have the form of one of the infundibula of the kidney was projected with no small degree of violence into the chamber-pot, and then the urine flowed in a full stream.—*Brodie.*

One ureter may become obliterated. In a patient in whom the bladder was extensively ulcerated (a stone had escaped into an ulcerated cavity of the perineum, from which Sir Everard Home extracted it), one kidney was found, after death, reduced to a third of its natural size: it contained a considerable quantity of pus. The ureter on this side had its cavity entirely obliterated; it was nothing more than a ligamentous cord extending from the kidney to the bladder.

SECTION III.

The Bladder.

The affections of the bladder are almost all secondary; that is to say, they are brought on either by extension of disease from other parts, or by the consequences which such disease provokes. They are, palsy, irritability, neuralgia, hypertrophy, sacculation, inflammation, abscess, ulceration, sloughing, fungus, calculus.

1. *Palsy of the bladder* presents the following varieties:—

a. Vesical paralysis combined with general paraplegia, from injury or disease of the brain, or spinal marrow, or nerves. Vesical paralysis depending upon lesion of the spinal marrow or nerves, is followed by chronic inflammation, and secretion of ropy mucus, as it has been already mentioned. The bladder requires to be regularly relieved by the catheter, and in some cases to be washed by injecting tepid water.

b. Hysteric paralysis. The general rule in this case is, not to draw off the urine for fear of encouraging the complaint. Yet care must be used in withholding this relief. A patient was admitted with hysteria into St. George's Hospital, and retention of urine, which had been long neglected: forty ounces of urine were drawn off by the catheter. The patient ultimately died. The bladder was of a very large size, as if it had been for a long time unusually dilated. It was throughout of a dark colour, almost black. There were only some slight vestiges of its natural structure left; the muscular fibres being very much wasted, and the internal membrane presenting the appearance of a very thin film, which was readily separated from the parts below. The dark colour of the bladder did not seem to arise from mortification, since there was neither fœtor, nor any other mark of mortification.—*Brodie.*

c. Paralysis of the bladder sometimes occurs in men *from inattention* probably, like the costiveness which supervenes after the impulse to pass the feces has been disregarded. A gentleman of sedentary habits, and of a nervous disposition, observed that he had not the usual desire to void his urine: and that, when he did void it, it was in a very slow stream, and in small quantity. On the following day he voided none at all; but he had at the same time no inclination to do so, and therefore did not suffer. Another day succeeded, and being still in the same condition, he thought it prudent to consult a surgeon: not because he experienced either pain or inconvenience, but because he knew, as he expressed it, that all could not be right. The surgeon introduced a catheter, which entered the bladder without the smallest difficulty, and drew off a large wash-hand basinfull of urine. The urine soon again collected in the bladder, and the catheter was again had recourse to. At the end of a few days, the patient regained the power of making water.—*Brodie.*

c. After an attack of prostatic retention of urine, the bladder is commonly paralyzed for a period varying from twenty-four hours to three or four weeks.

2. *Irritable bladder.* Frequent urgency to pass the urine, without vesical disease, is sometimes the result of mere nervousness: it may be produced by an altered state of the urine, or by sympathy with disease of the kidneys, and is a frequent attendant upon advanced age.

A gentleman who suffered from a most severe irritation of the bladder, in consequence of disease of the kidneys, discovered the following method of giving himself relief. Once a day he introduced an elastic gum cathether, through which he injected into the bladder as much tepid water as it was capable of containing. At first the bladder would admit a small quantity only, perhaps an ounce; but by degrees he was able to inject a larger quantity, amounting at last to half a pint or more. And now, instead of voiding urine every twenty or thirty minutes, he was able to retain it for two hours, or even longer. As soon as he omitted the use of the injection, the bladder returned to its former habits.—*Brodie.*

3. *Neuralgia.* The bladder is sometimes the seat of pain

neither dependent on disease in it, nor of the viscera with which it directly sympathizes. A gentleman whom I attended had constant neuralgia of the bladder, and in the eye-balls: he suffered besides occasional severe attacks of spasm of the sphincter ani.

The bladder is sometimes the seat of sympathetic pain when the disease is in the kidneys. "A patient," says Morgagni, "complained of very little pain in the region of the kidney; while he was tormented with pain in the bladder so excruciating, that five or six physicians who attended him entertained no doubt that the seat of the disease was in that organ. On dissection, however, no morbid appearance was discovered in the bladder, but there were large and ramifying calculi of the kidney.

4. *Hypertrophy of the bladder.* The muscular coat of the bladder, when called upon or excited to repeated and forcible action through stricture of the urethra, or prostatic enlargement, or calculus, becomes firmer, thicker, and of a darker colour: it sometimes attains a thickness exceeding half an inch. In this state it does not dilate as before, and is incapable of holding more than a few ounces of urine. [*x*. 100.]

5. *Sacculation of the bladder* is a hernia of the mucous and submucous coats, a fold of which is pushed out between the muscular fasciculi, whereby a sac is formed external to the bladder, but communicating with it. Such sacs are never formed, unless there is obstruction to the escape of urine from the bladder. I have seen as many as five sacculi upon one bladder. [*x*. 105.] The principal pathological relation of these sacs is to calculi: they have occasionally given rise to great ambiguity in cases of stone, from the temporary or permanent disappearance of the symptoms, on the stone happening to slip into one of them.

6. Acute inflammation of the mucous lining of the bladder occasionally supervenes in gonorrhœa. The symptoms are, pain and weight, and frequent and painful micturition: the appearances, a bright red colour of the membrane, principally upon the prominences of the rugæ. I have seen a specimen of this disease following the abuse of injections in

gonorrhœa, where death ensued. It is attended with inflammatory fever, and is liable to excite vesical ulceration and suppuration.

7. *Subacute inflammation* of the bladder is commonly the result of stricture of the urethra, of enlarged prostate, or of calculus, or paraplegia. The inner membrane reddened, and secreting a thick tenacious mucus, of a greyish brown colour, and of an ammoniacal smell, are the characteristic features of the disease. Effusion of lymph, ulceration of the mucous lining, and suppuration, are liable to follow.

The tenacious mucus, which belongs to this state of the bladder, deposits, as Dr. Prout pointed out, phosphate of lime. When phosphate of lime from this source coexists, as it often happens, with the triple phosphate in the urine, a combined salt is formed, which will be presently described. I introduce the remark in this place to lead to the mention of an important improvement in practice by Sir Benjamin Brodie in cases of subacute inflammation of the bladder, where tenacious mucus is present with or without the calculous matter. In the second case, a weak solution of nitric acid (beginning with a drop, gradually increased to two, of concentrated nitric acid to two ounces of distilled water), injected into the bladder, acts as a salutary astringent; in the first, this menstruum at the same time dissolves the vesical concretion; and may even be employed to reduce a calculus, when its surface is composed of the phosphates, to a size in which it can be voided with the urine.

8. *Ulceration of the bladder* presents various appearances; sometimes the whole lining membrane is absorbed, and the muscular fibres have the appearance of being cleanly dissected: at other times the bladder is covered with numerous circular ulcers. The pain attending the passage of the urine, and continuing for some time afterwards, appears to be of the most severe character.

9. *Sloughing of the bladder* is the consequence of long-continued retention: it commonly occurs towards the fundus. [*x.* 110.] It is the danger of this contingency that render imes necessary to puncture the bladder in re-
te

10. ***Abscess of the bladder.*** In some cases of stricture of the urethra, where the disease has existed for a great length of time, abscesses form in the cellular membrane of the bladder; which eventually point in the groin or above the pubes, discharging putrid and offensive pus, and afterwards urine.

11. *Fungus hæmatodes.* In a case which I examined with the late Mr. Wilson, in which the existence of stone had been suspected from pain in the bladder and occasional discharge of blood, a fungus was found attached by a narrow pedicle to the mucous membrane: the texture of the fungus was soft, and its surface shreddy and ragged.

In a patient who died in the Middlesex Hospital, with medullary sarcoma affecting the uterus and neighbouring part of the vagina, the bladder was studded with little white tubercles, about the size of peas, which had formed behind the mucous coat, but projected inwards. They appeared, when cut through, of the same medullary texture with that which grew from the uterus and vagina.

Local uneasiness, frequent micturition, blood in the urine, retention, if, as in a case of Mr. Stanley's, the accidental growth of the fungus towards the ureters plugs the orifices of the latter, are symptoms of the disease.

12. *Vesical calculi* may be considered in reference to their chemical composition, to their symptoms, and to the modes of getting rid of them.

a. Varieties of vesical calculi.

1. *Lithic acid calculi.* Generally of an oval form, and slightly flattened; of a brownish red colour, approaching that of mahogany; rather smooth on the surface, but not polished, except occasionally from friction when there are two or more calculi in the same bladder. If broken, the lithic acid calculi split into concentric laminæ.

2. *Oxalate of lime,* or *mulberry calculi*; of a dark brown colour, rough and tuberculated on the surface, very hard, and imperfectly laminated.

3. *The triple phosphate of ammonia and magnesia.* This salt forms a fragile calculus; and when broken, it does not, like the lithic acid calculus, split into concentric laminæ. The surface is uneven, covered with minute crystals.

4. *Phosphate of lime.* Calculi composed of this substance, unmixed with other calculous matter, are rarely found in the bladder; and when they are, there is reason to suspect, from Dr. Prout's observations, that they have their origin in the secretion of the bladder itself, and not in the urine. These calculi are of a pale brown colour, and of a laminated structure.

5. Although it is rarely that we find a bladder calculus composed altogether of phosphate of lime, we frequently find this salt existing in combination with the triple phosphate of ammonia and magnesia. The mixed calculus is of a white colour; friable, not unlike a mass of chalk in appearance; not in general laminated. It melts into a vitreous substance, when exposed to heat in the flame of a blowpipe; and hence it has received the name of the *fusible calculus.*

6. *Lithate of ammonia.* This variety of calculus is of a clay colour: sometimes it is smooth, and at other times tuberculated on its surface: it is composed of concentric layers. Dr. Prout regards it as being almost peculiar to children.

7. *Lithate of soda.* This is a rare calculus of a white colour, like the chalk-stones of gout; probably formed where a patient, having a lithic acid diathesis, takes large quantities of soda.

8. *Cystic oxide.* A rare kind of calculus of a white colour; and, when broken, found not to be laminated, but appearing as one mass confusedly crystallized throughout its substance.

9. Calculi are sometimes composed of *carbonate of lime;* but these are of very rare occurrence indeed. The carbonate of lime, however, is frequently blended in small quantity with other ingredients.

10. Dr. Marcet has also described a variety of calculus under the name of *xanthic oxide;* and another under that of the fibrinous calculus.

11. The *fibrinous calculus* appears to be composed of the fibrin of the blood. Sir Benjamin Brodie, from whose Lectures on the Diseases of the Urinary Organs I have

taken the above enumeration, states, that he has met with one instance only of this kind. It was of an oval shape, about the size of a horse-bean, yellow, semi-transparent, not very unlike amber, but less hard. When dried it shrunk to a small size. Its existence in the bladder had not been suspected during life. The kidneys were in the state connected by Dr. Bright with the formation of albuminous urine.

Some calculi are found composed throughout of one of the substances which have been described nearly pure. In others we find the different substances disposed in layers, the lithic acid distinct from the oxalate of lime; the oxalate of lime distinct from the triple phosphate, and so on; while in others they are intimately blended together. As Mr. Brande long ago observed, the centre, or nucleus, is generally either lithic acid or oxalate of lime. In many cases the additions to the calculus are of the same chemical composition with the nucleus; in other cases we find the lithic acid deposited on the outside of the oxalate of lime; and more rarely, the oxalate of lime is deposited on the surface of the lithic acid. The deposit of lithic acid, or oxalate of lime, may take place in the bladder, where there is no evident disturbance of the general health. If the general health becomes affected, and the bodily powers of the patient are impaired, either from the irritation of the stone in the bladder, or from any other cause, the urine becomes alkaline, and, in consequence, the subsequent additions of the calculus are formed of the triple phosphate of ammonia and magnesia. When the calculus has existed for some time in the bladder, it frequently happens, and indeed it always happens sooner or later, that the mucous membrane becomes inflamed, and adhesive tenacious mucus is secreted, which contains phosphate of lime; and this being blended with the triple phosphate, constitutes the fusible calculus. Calculi found in the ducts of the prostate gland, are composed of phosphate of lime, pure or nearly so. But whatever may be the condition of the bladder, it is a very rare occurrence to find a simple phosphate of lime calculus in it. In cases of chronic inflammations of the bladder, the phosphate of lime is deposited by the mucus in small masses; but these nuclei being exposed to the contact of the urine, and the health becoming impaired, as always is the case under these circumstances, the triple phosphate is added to the phosphate of lime, so as to constitute the fusible calculus.—*Brodie.*

Dr. Prout, with whom the latter observations originated, has furnished us also with a knowledge of the following most important and interesting facts in the history of calculous formations. There are but few cases in which the phosphates form the nucleus of a calculus; but being once deposited, they continue to be so, and are not followed by other depositions. The phosphates may succeed the lithic acid or the oxalate of lime, but neither of these can succeed the phosphates. If the external surface of a calculus is composed either of the lithic acid or of the oxalate of lime, you may be certain that there are no phosphates in the interior; whereas if there are the phosphates on the outside, the general rule, to which there are but few exceptions, is, that some other substance lies underneath.

b. The symptoms of vesical calculi are, pain in the bladder, frequent urgency to make water, increased pain at the close of micturition (when the bladder presses against the stone), that originates in the bladder, extends along the urethra, and is felt with aggravation at its under part immediately within the orifice. Pain in the loins, bloody urine and increased vesical pain after riding on horseback or in a carriage. In the history of the case, the period of the descent of the calculus from the kidney is often marked. The patient remembers having experienced pain in the loins, extending down one ureter, which had lasted a couple of days, and was followed by a clot of blood in the urine, and relief of the pain; but the bladder may have continued irritable for a week: after which the stone may have produced no further irritation for months or years; at length its increased weight, or continued presence, gives rise to inflammation and its sequelæ.

All the symptoms of stone in the bladder which have been described may be fallacious. To be sure of the existence of stone in the bladder, it must be felt with the sound; which, however, occasionally fails of detecting the stone, unless the patient is examined in every variety of posture, and with every shape of instrument.

There is a mechanical symptom which is highly diagnostic. The urine is liable to be suddenly stopped as it flows from the bladder, by the stone falling against the vesical orifice of the urethra.

Where there is even a small calculus in the bladder, it rarely happens that the urine retains its natural clearness and transparency. A slight cloud is perceptible in it as soon as it begins to cool, and a mucous deposit takes place afterwards.

Sometimes the progress of the symptoms is slow, and it may be four to ten years before the patient is driven to apply for surgical relief. In the common course of events they reach a height, which renders the patient a great sufferer in the course of two or three years. At first his general health is unaffected; but at last the health begins to suffer, the urine becomes alkaline, and the triple phosphate is deposited on the original stone. Now all the symptoms are much aggravated. The alkaline urine is more stimulating to the bladder than healthy urine. Inflammation of the membrane follows; the pain is greater; the desire to void the urine almost constant; the urine voided is offensive, soon becoming putrid and ammoniacal, and depositing the usual thick tenacious mucus streaked with blood.

A patient with a simple lithic acid calculus suffers less than one with a calculus composed externally of the triple phosphate; and the latter less than a patient with a fusible calculus. The oxalate of lime, or mulberry calculus, on the whole occasions more distress than the lithic acid calculus, from the irregularity of its shape.

There are certain spontaneous changes which occasionally take place, and relieve the patient of half or all his sufferings. The most tender part of the bladder is its neck. Enlargement of the third lobe of the prostate, by pushing the stone away from the neck, and fixing it behind it, has removed all the suffering. A stone that falls into, and is retained in a cyst by sacculation of the bladder, is equally out of the way of irritating.

c. Removal of calculi. When a calculus is sacculated towards the rectum, so as to be felt prominent and almost projecting into that viscus, it should be extracted by an incision from the rectum. When the prostate is greatly and irregularly enlarged, and the sufferings from stone intolerable, the high operation should be performed. In a child lateral lithotomy is unattended with risk. In an adult suffering under great irritation of the bladder, from the presence of a stone, the kidneys and other viscera sound, lateral lithotomy should be performed. If the stone or stones are small, they may be removed by forceps through the urethra.

But in the majority of cases there is no doubt that, when surgeons become familiar with the use of the instrument for crushing with a screw the stone in the bladder, it, or improvements upon it, will supersede every other method.

SECTION IV.

Prostate Gland.

The prostate gland is liable to be affected with acute inflammation, chronic inflammation, abscess, ulceration, hypertrophy, calculi.

1. Acute inflammation of the prostate is produced by extension of gonorrhœal inflammation: the complaint is marked by a sense of weight and pain in the perineum and at the neck of the bladder, by increase of pain and heat at the latter part on making water. The bladder is more or less irritable, and generally partakes in a greater or less degree in the inflammatory action. Retention of urine occasionally supervenes. Rest, the recumbent posture, cupping in the perineum, with other obvious remedies, are certain to allay the disorder, if so treated early.

2. Chronic inflammation may follow the acute stage, the patient not being sufficiently cautious during recovery.

3. Abscess is the result either of acute or chronic prostatic inflammation: a prostatic abscess naturally breaks into the urethra, sometimes into the rectum. The latter case gets well readily, the former is often extremely troublesome from urine entering and keeping up irritation in the abscess. The

existence of prostatic abscess is often first discovered through the sudden discharge of pus with the urine. The complaint is to be suspected when inflammation of the gland continues obstinate: examination by the rectum will often decide its presence; and even when its presence is uncertain, if there is much constitutional disturbance, with rigor, and fulness and pain about the prostate, a lancet should be plunged deep into the perineum to endeavour to give vent by a harmless channel to the pus.

Cases of abscess of the prostate in young men and adults are of not unfrequent occurrence — they are rare in old age and in infancy. Sir Benjamin Brodie mentions three cases of the former class, where the disease was combined with chronic enlargement. An infant, two years of age, came under my own care, with retention of urine, which required the repeated use of the catheter. The catheter when introduced sometimes drew off pus, at other times urine; by care in the management of the instrument the bladder, however, could always be relieved. The infant died, and a large abscess of the prostate was found opening into the urethra by a considerable orifice, into which the catheter had passed on those occasions when matter flowed instead of urine.

4. *Ulceration* of the vesical surface of the prostate is an occasional attendant upon chronic enlargement; it greatly aggravates the patient's sufferings, causing the most agonizing pain when the bladder acts.

5. *Hypertrophy*, or chronic enlargement of the prostate, is a change to which the part is liable, when the frame is beginning to feel the effects of age. [*x*. 119. 120.]

The enlargement in general is unattended with alteration of texture; sometimes the gland is softer than usual, sometimes in parts it is remarkably hard; it never, I imagine, becomes carcinomatous.

The enlargement occupies either both lateral lobes equally, or one more than the other, or the third lobe less or more than either. The enlargement varies from a trifling increase of bulk to twenty times the natural size of the gland. The suffering which attends the disease is from retention of urine, and is at first the mechanical distress of the bladder and kidneys. The frequency and severity of the fits of retention bear no relation to the absolute enlargement of the gland. However, when there is much enlargement, the bladder can never be completely emptied: several ounces of urine remain after its seeming entire evacuation, the parts of the enlarged prostate coming together and impeding the escape of more. It is not easy to account for the fits of retention, which have a character of spasm. They supervene unexpectedly, but are commonly attributable to exposure to cold. The urine, which flowed tolerably freely the day before, is completely obstructed. Relief can only be given by the catheter, which either is to be retained in the bladder, or passed twice a day for a period, varying from forty-eight hours to three weeks: the bladder becomes temporarily palsied by each of these attacks.

The form and kind of catheter must be determined by the form of the prostatic enlargement, and that is only learnt by the trial of different forms and kinds of instruments. The most generally useful are silver catheters, with a long curve and point well turned up, and elastic catheters, which have been long kept upon a stilet of this shape.

An hypertrophied prostate, after being divided in lithotomy, commonly lessens.

A prostatic enlargement is sometimes formed of a thick cyst containing mucus. [*x*. 125.]

Calculi of the prostate are round, of a reddish colour externally, and composed of phosphate of lime.

SECTION V.

Urethra.

The urethra is liable to acute and chronic inflammation, to stricture and ulceration, to obstruction with calculi.

1. *Acute* inflammation of the membrane of the urethra may be produced by mechanical injury; but the ordinary cause of the complaint is the contagion of gonorrhœa. In the latter case the complaint begins at the external orifice with

a mucous discharge, commonly attended with tenderness of the inguinal glands on one side. After three or four days the discharge becomes a thin pus, and the urine produces a sensation of scalding in passing: in two or three days more the discharge is a thick greenish matter, occasionally tinged with blood, and the membrane is acutely sensible. The disease then spreads down the urethra, extending about half an inch each day. The pain is greatest in the portion last affected, subsiding towards the orifice: when the disease occupies the urethra in the middle of the spongy body, chordee is produced. When the inflammation has arrived at the membranous part of the urethra, after existing there a few days in considerable severity, it often returns to the commencement of the urethra, and the same stages are repeated. If the disease is neglected, it occupies the whole urethra with virulence, or attacks the prostate and bladder, or one or both testes. Gonorrhœa has some relation not understood to syphilis: it is capable of producing inflammation of the joints and of the mucous membrane and internal structure of the eye, and is the common cause of stricture.

Chronic inflammation of the urethra is a common sequela of gonorrhœa; when seated near the orifice, it gives rise to a transparent discharge, occasionally coloured yellow. When remaining, as it frequently does, at the junction of the spongy and membranous portions of the urethra, it is the immediate cause of permanent stricture. A subacute inflammation of the urethra lasting a week, frequently occurs as an accidental attendant upon stricture of the urethra; and is liable to occur in some habits without any very obvious reason.

2. Stricture of the urethra is either spasmodic or permanent.

a. Spasmodic stricture I have never met with, except at the point where the urethra passes through Camper's ligament. It is by no means ascertained upon what texture the temporary obstruction depends. It is liable to be brought on by cold, or by excess, in cases where the patient before and afterwards experiences no inconvenience. It yields always to the pressure of a properly directed silver catheter.

Permanent stricture of the urethra begins in opacity and loss of extensibility of part of the lining membrane from chronic inflammation. [*x*. 130. 131.] The ordinary length of a stricture is about two lines; but it varies from half a line to an inch and a half. [*x*. 135.] The ordinary place of stricture is the passage through the ligament of Camper; but sometimes stricture occurs in the middle of the urethra, sometimes at the orifice; it never occurs in the membranous part of the urethra, or in the prostate. Generally there is but one stricture; sometimes there are several: in that case the first and the narrowest is situated at Camper's ligament. Sometimes the whole length of the urethra contained in the corpus spongiosum is narrowed, and at particular points more especially contracted. Sometimes the orifice alone is contracted. A linear stricture is sometimes oblique. [*x*. 132. 134.]

When the channel of the urethra is constricted at any part several local consequences follow.

a. The texture surrounding the membrane becomes condensed by an extension of inflammation.

In a gentleman from a hot climate, who died after cure of a stricture, which was attended by, and left considerable firm gristly induration at one part of the urethra, the tumour was found to have been caused by a deposition of lymph into the cells of the corpus spongiosum. Immediately behind the stricture there was an orifice leading into a long narrow sinus, extending from the urethra *forwards* into the gristly substance of the tumour.—*Brodie.*

b. The urethra behind the stricture becomes more or less dilated. In the following case the dilatation was extraordinary.

In a gentleman, who laboured under stricture, the canal behind the obstruction was so dilated, that whenever he made water a tumour as large as a small orange, and affording a distinct fluctuation, could be felt in the perineum.—*Brodie.*

c. The surface of the distended part is liable to inflame, and to be covered with an exsudation of coagulable lymph. [*x*. 137.] This circumstance will cause pain in the expulsion of the urine. *Some* pain and heat in the urethra are generally present from irritation of the surface posterior to the stricture, in every case of considerable contraction. The pain is felt less at the part than at the extremity of the urethra. It appears situated in the lower part of the urethra, half an inch behind the orifice.

The danger as well as chief distress arising from stricture, are in the state of the bladder and kidneys, which are liable, from the force necessary to the expulsion of the urine, to chronic inflammation, ulceration, and abscess—the bladder even to slough. [x. 110.] Some of the local consequences of stricture may be viewed as efforts of nature to save the more internal organs from one or other of these lesions.

d. Stricture of the urethra sometimes disappears *by ulceration:* at any rate, it is difficult on any other supposition to account for the phenomena of the following case.

A gentleman, who had laboured under stricture of the urethra for a great number of years, now voided his urine with the greatest difficulty: the stricture was rigid and unyielding; but a catgut bougie was introduced, which enabled him to make water in a small stream. Under these circumstances he was seized with pain in the act of making water, which lasted for some minutes afterwards. The pain became more severe: it was referred to the situation of the stricture in the posterior part of the urethra, and the patient described it as intolerable. He said, he could compare it to nothing but the pain which he supposed would be produced if melted lead were poured into the urethra. Every half hour he had a desire to make water; and his screams and groans could be heard not only over the whole house, but even in the street. In the course of a few days these symptoms began gradually to abate, and the urine flowed in a much larger stream. When the attack had completely subsided, the condition of the patient was much improved, for he made water more freely than he had done for many years.—*Brodie.*

e. Sometimes abscess forms deep in the perineum, and close upon the membranous portion of the urethra. [x. [illegible]] Such an abscess is attended with fever, [illegible] [illegible], and great prostration, and should be opened as soon as suspected. When opened, the urine either at first, or in a day or two, staff immediately anterior to the stricture; the staff being then drawn back, the scalpel is to be carried in the direction of the urethra *through the stricture,* dividing it; a catheter is finally passed into the bladder, and retained there. Incisions are to be made into the integuments of the swollen scrotum and penis, to allow the escape of the infiltrated urine, and so to lessen the extent of sloughing.

In complicated urinary fistula, with stricture impervious to instruments, the best practice is to perform the same operation, *having previously dilated the urethra to behind the scrotum.* After free division of the parts, the general induration of the perineum disappears in forty-eight hours; and a free channel being given to the urine through the catheter, the vesical and renal irritation quickly subsides. Granulations soon grow up in the wound, and closing in upon the catheter, the incision gradually cicatrizes. The catheter should be changed every day; and the patient never allowed to make water without the instrument till all is healed.

This operation I have several times performed, and twice under circumstances in which I would not repeat it. The cases were impervious stricture, with vesical irritation, but unattended with rupture of the urethra or fistula. One of these cases did perfectly well. Another surgeon had tried to perform the operation on this patient a week before; and, after protracted ineffectual attempts, had relinquished it. I set to work upon the old wound, and the operation was successfully finished. In the other case referred to, all went on well for a week: the catheter then unfortunately during the night slipped out, and the patient made water without it: the result was, infiltration of the parts about the wound, followed by inflammation, and an abscess, which opened into the urethra anteriorly to the scrotum, and has left *there* a permanent fistula, the perineal wound having closed.

The accident which occurred in this case has determined me not again to divide a stricture from without, merely for retention unattended with rupture of the urethra, or unless exhausting urinary fistula is present likewise.

In cases of otherwise irremediable retention from aggravated stricture, with danger of sloughing of the bladder, puncturing the bladder from the rectum or above the pubes is to be resorted to.

3. Calculi that have escaped from the bladder are liable to become impacted in any part of the urethra: if in the membranous part, they may be cut down upon, and extracted with safety. If in the corpus spongiosum, they are generally within reach of forceps introduced at the external orifice. Under urgent retention, and impossibility of extracting the calculus by forceps, it would be better to push it back towards the membranous part, and cut upon it from the perineum, than open the urethra anterior to the scrotum, which is apt to leave irretrievable fistula.

SECTION VI.

Testis.

The diseases in which the testis is concerned are referable to three heads:—diseases of the testis; of the tunica vaginalis; of the cord.

I. The testis is liable to acute inflammation, chronic inflammation, tuberculous disease, atrophy, medullary sarcoma, hydatid disease.

Every disease of the testis is liable to be attended with pain in the loins, which is lessened by supporting the testis, and by the recumbent posture, and aggravated by the reverse.

1. *Acute inflammation* of the testis is characterized by pain and swelling, usually commencing in the epididymis; by pain stretching along the cord to the back; by inflammatory fever, often attended with vomiting; and by tenderness of the abdomen resembling acute peritonitis. Acute inflammation terminates either in resolution, or in chronic inflammatory enlargement, or hydrocele, or in both. The common causes of this disease are, local violence, or metastasis or direct continuation of gonorrhœal or simple inflammation along the spermatic cord.

2. *Chronic inflammation* of the testis presents great diversity of feature: sometimes it occupies the body of the testis, sometimes the epididymis which becomes hard and knotted, occasionally both.

Chronic inflammation of the testis occasionally occurs as one of the direct consequences of syphilis. There is a patient now in the Middlesex Hospital under my care, in whom this affection supervened upon chancre, and was shortly followed by psoriasis upon the back, and arms, and head.

Chronic inflammation of the testis is often accompanied by effusion of serum into the tunica vaginalis: in that case considerable pain is generally experienced from the pressure of the fluid on the gland. The pain is relieved upon letting out the fluid. [*x*. 161.]

Chronic inflammation of the testis may terminate in abscess. To this head I think should be referred some of the cases (some to which the subsequent description applies being certainly tuberculous) which Sir Benjamin Brodie speaks of as scrofulous disease. The patient, says Sir Benjamin Brodie, describing this disease, experiences a slight pain at one part of the testicle, and you feel there a little enlargement, generally at one end of the epididymis. He then experiences pain at another part, and you find there another enlargement, and this is generally also on the epididymis. These little tumours increase in size, becoming gradually more painful. Sometimes as many as three or four of these tumours are found on the surface of the epididymis. The skin becomes adherent to them, and one of them becomes an abscess, which bursts through the external skin. A similar abscess forms in another, and runs the same course. These abscesses discharge very little matter, and they do not heal like healthy abscesses. When you introduce a probe into one of the sinuses thus formed, you find that it passes down into the centre of the tubercle or tumour in which the abscess originated. The disease will go on in some instances until the whole of the testicle becomes disorganized. Sometimes it is confined to one testicle; sometimes both are affected in the same manner. Sometimes it will completely destroy one of the testicles; but more frequently the testicle is only partially injured, and a great deal of the glandular structure remains in a natural state. [x. 160.]

The following instance, which Sir Benjamin Brodie appears to have considered a morbid growth, was possibly chronic inflammation of the testicle.

A man was admitted into St. George's Hospital with the testicle enlarged and hard. There were certainly not exactly the symptoms of chronic inflammation of the testicle; but it was treated at first as if of this nature, and mercury was administered, but without making any impression upon it. Other remedies having been tried, Sir Benjamin Brodie thought it would be safer to amputate the testicle, and the operation was performed. When the testicle was examined, its structure gave the idea of cellular membrane condensed into a firm solid substance. It was of the consistence of ligament, without its fibrous structure. Between six and twelve months after the operation, the man returned to the hospital, having a disease apparently similar just begun in the other testicle. One part had become hard, somewhat enlarged, and the feeling communicated to the fingers was exactly similar to that which had been given by the testicle formerly affected. As an experiment, iodine was given internally, and the iodine ointment was probably rubbed on the part. The hardness not only did not increase, but it became in some degree diminished; at any rate the progress of the disease was stopped, and the patient left the hospital with the greater part of the remaining testicle in a sound state.

3. *Tuberculous disease* begins in the deposition of tuberculous matter at one or more places in the substance of the testis or epididymis. Sometimes on examining a tuberculous testis, two or three nodules of yellow cheesy matter are found [*x*. 165. 166]; sometimes the whole structure of the testis seems to have disappeared, and to be replaced by tubercle. [*x*. 167.] Sir Benjamin Brodie conjectures, that the primary seat of this deposit is the mucous surface of the tubuli testis, having observed it in the canal of the epididymis. It is probable that both the mucous and interstitial membranes of the testis can secrete it.

The disease begins without pain. There is slight nodular enlargement, which increases: after a while, general uneasiness or pain in the gland, extending after standing or walking to the back, as in other affections of the testicle.

The disease sometimes ends in the form of abscess, to which the description given under the head of chronic inflammation, applies: at other times, the suppuration and discharge of the tuberculous matter is attended with another feature. The skin inflaming over a prominent part of the tumour, and ulcerating, gives issue at first to matter alone; then, in addition, to a slow fungous protrusion, firm, of a pink colour, irregular and channelled on its surface, sometimes insensible, sometimes with the ordinary sensibility of the testis. This fungus consists of inflamed and swollen tubuli testis.

The inflammation and suppuration are efforts to throw out the tuberculous matter. The extent of the fungus depends upon the quantity of the tubuli implicated in the disease. After the tuberculous matter has been expelled, the fungus shrinks, the surrounding cutaneous inflammation lessens, the ulcerated orifice contracts, the wound heals; the testis is left free from disease, but more or less reduced in volume, through consolidation of the tubuli to a greater or less extent, but generally considerable.

Atrophy. Wasting of the testis, it is said, has been produced by the continued use of iodine. Sometimes atrophy takes place without any apparent cause, or from excess. Partial atrophy often follows chronic inflammation or tuberculous disease. Sometimes the same effect follows acute inflammation.

Mr. S——, when nineteen years of age, received a blow on the testis from being thrown on the pommel of a saddle. In the evening of that day he was seized with excruciating pain in one testis, which swelled to a great bulk in a week: then the inflammation and swelling began to subside; but its decrease did not stop at the natural size of the testis, but the absorption proceeded until the gland disappeared. The spermatic cord was much smaller on the diseased side than on the other. The vas deferens was much less than natural.

A small portion of the epididymis could be felt; but the testis was not larger than a pea: it had feeling, but less than the healthy testicle.—*Cooper.*

A gentleman died, who had had inflammation of the testis from a gonorrhoea twenty years before; after which the testicle was smaller than the other, and a part of it remained considerably indurated. On inspection, about two-thirds of the tubuli testis remained in their natural condition; while the remainder had become converted into a white substance, having the consistence, but not the fibrous structure of ligament.—*Brodie.*

4. The form of malignant disease which infests the testis is *medullary sarcoma.*

The complaint cannot be mistaken when uncomplicated. The gland slowly swells into a large, even, weighty, elastic tumour, seldom attended with much pain or tenderness on pressure. But the weight is distressing, and causes aching and pain in the loins. On puncturing it with a grooved needle, medullary matter escapes with blood.

The tumour when cut into is found to consist of a pulp, which varies in character from a close resemblance to cerebral matter (which is the least usual) to a greyish soft and almost diffluent texture, from which, on the least pressure, a thick whitish fluid exudes with blood and serum. There is some variety in different instances in the external characters of the disease, arising from the greater or less thickening and adhesion of, or effusion in, the tunica vaginalis; from the place of the medullary sarcoma, either central or near one side of the testes; from the greater or less degree of thickening and induration of the septa of the testes involved in the disease; and from the occurrence or not of cysts in the tumour. [*x*. 170.]

The part is to be amputated if the patient is otherwise in health, and there is no evidence of the existence of medullary sarcoma in any other organ. The disease, however, almost always reappears in the lumbar lymphatic glands.

5. *Hydatid disease.* Under this name Sir Astley Cooper has described enlargement of the testis with cysts filled with serum or mucus, or a clear water containing little ani-

mal matter, and not of a malignant character. The disease is not of common occurrence.

A young man twenty years of age, without any obvious cause for it, found a tumour at one extremity of the testis. It was at first unattended with pain; was usually soft to the feel. It grew larger, and was at one time soft, at another hard; generally attended with little pain, sometimes extremely painful. It was extracted after a twelvemonth.

On cutting into the testicle, it was found to be composed of numerous cysts, of different sizes and forms, containing a serous fluid in some parts: at others it was like the white of egg. In one part the testis was very compact, and at that part there was a tendency to suppuration.—*Cooper.*

II. The *tunica vaginalis* participates in the acute inflammation of the testis; is liable to chronic inflammation, thickening, adhesion, hydrocele, hematocele, malignant disease.

1. *Hydrocele* is a sac containing water connected with the testicle or the cord. It presents two varieties—hydrocele of the tunica vaginalis, and encysted hydrocele.

a. Hydrocele of the *tunica vaginalis* is so called from the liquid effused being contained in that cavity. The fluid is of an amber colour, and quite transparent. A large portion of it coagulates with heat, and on the addition of nitric acid. It resembles very nearly the serum of the blood, both in its appearance and chemical composition; the chief difference being, that it contains rather less albumen. Every now and then a number of small greasy particles of a yellow colour, with something of a metallic lustre, are found in it, which are probably adipocire. [*x*. 180.]

The tunica vaginalis often remains unaltered in hydrocele. Sometimes however, especially in old hydroceles, it becomes thickened. Occasionally, conjointly with thickening, the inner surface is found honeycombed, the result of effusion of lymph upon it. Occasionally, little bodies, like the loose cartilages of a joint, grow from its free surface. [*x*. 162.]

The sac which contains the water often exhibits an hourglass contraction at its middle: at this part the walls of the

sac sometimes adhere and grow together, converting the
one sac into two. In a case of hour-glass-shaped hydro-
le, Sir Benjamin Brodie drew off all the water through one
ning at the lower part. A year afterwards, the hydro-
le having filled again, the lower part was again punc-
ured; but the upper did not empty itself as before, but
quired to be separately opened.

Hydrocele generally forms slowly and without pain, or
parent cause. Sometimes it seems to depend upon in-
mmation of the testes and tunica vaginalis; and some-
he irritation of the little cartilaginous bodies in
ca may cause the disease. Sir Benjamin Brodie
he case of a gentleman with hydrocele, who, as
soon as the water was drawn off, used to lie down and
an with agony for a quarter of an hour. When he died,
loose cartilage was found in the sac.

ommon cause of hydrocele is strain of the loins. A
m was admitted into the Middlesex Hospital with hydro-
e, which had come on a few days before. It contained
about six ounces of water. The patient declared that the
welling had come on within half an hour after he had made
n effort beyond his strength in pushing a carriage into a
coach-house, which sensibly strained his back. In general the effusion into the tunica vaginalis follows the strain of the loins at a longer interval and more slowly.

Hydrocele in adults seldom goes away spontaneously. When this event happens, it is probably caused by some degree of inflammation of the membrane supervening, which stops the tendency to secrete water. Sometimes the sac spontaneously suppurates, and on being punctured, granulates and becomes obliterated. The common practice of injecting equal parts of port wine and water to cure hydrocele, acts by altering the mode of action, not by causing general adhesion of the membranous surfaces and closure of the sac.

Hydrocele is common in infants; it generally spontaneously goes away. Sometimes the distension is so great as to cause pain or uneasiness: in that case the tumour had better be punctured. The fluid occasionally has a free passage to and from the abdomen, the peritoneal canal remaining open: in that case a truss should be worn to prevent hernia. In time the liquid is absorbed, and the canal closes.

Hydrocele is often combined with chronic inflammation of the testes, and the patient suffers considerable pain from the pressure of the liquid on the inflamed gland. The pain is relieved by letting off the water.

b. An *encysted hydrocele* is a thin membranous cyst, ordinarily containing a transparent water, which contains no coagulable matter: held in a spoon over the flame of a candle, it nearly all evaporates, leaving the smallest possible residuum of animal matter. Occasionally, however, the contents are a yellow serum, like the fluid of common hydrocele. Encysted hydrocele occurs in the cord, upon the epididymis, when it lies between that tube and the tunica vaginalis; upon the body of the testis, when it is contained between the tunica vaginalis and the tunica albuginea. [*x*. 175.]

This kind is commonly of slow growth, and forms a tumour of small size, which remains without changing for years. When punctured, it is more likely not to reaccumulate than common hydrocele.

2. *Hematocele.* This term is given to two affections—one, effusion of blood, the other, of sanguinolent serum into the tunica vaginalis. [*x*. 178.]

The latter, I believe, may alternate with hydrocele, the secretion being from an accidental cause dark and turbid at one time, clear and serous at another. It may likewise arise from blood being mixed with the serum of the hydrocele, in consequence of a bruise on the testes, or from a vessel having been punctured in tapping a pre-existing hydrocele.

The former is the direct consequence of mechanical injury to the part; if the effusion of blood is small, it will be partially or wholly absorbed. If of any quantity, it should be evacuated, lest its pressure should excite disease or absorption of the testis. The proper method is to make an incision into the sac, allow what is disposed to do so to come away, and then to apply a poultice, into which the effused blood will gradually be discharged.

3. *Malignant disease* of the tunica vaginalis.

Mr. T. aged sixty, affected for fifteen months with swelling of the testes, went through repeated mercurial courses for its removal, under the advice of Sir Benjamin Brodie, Sir Astley Cooper attending in consultation. The remedies oving fruitless, it was at length agreed that the diseased part should be removed, if, upon puncturing, the quantity of fluid should be found inconsiderable. On passing a lancet into the part in three different places, although the fluctuation was apparently decreased, no water was found. The testicle was then removed by Sir Benjamin Brodie, and upon issection the appearances were as follow:—The testis was ctly sound. The cavity of the tunica vaginalis was pied by a spongy effusion, which was thought to have he character of incipient fungus. The tunica vaginalis was thickened, and had a piece of ossific matter in it. The patient died of erysipelas.—*Cooper.*

III. The cord is liable to inflammation, to be the seat of ted hydrocele, and to the complaint next described. ele, or varix occurring in the spermatic veins, which ms a large soft nodular compressible mass, of a conical or amidal shape, stretching from the testis to the groin. e complaint is attended with a sense of weight and dragging, and pain in the loins. It is more frequent on the left side than on the right, owing to the position of the sigmoïd flexure of the colon over the left spermatic veins. For the same reason it is often benefited by purging. The use of a suspender and cold astringent lotions are generally sufficient to prevent this complaint being very troublesome. In one case, Sir Benjamin Brodie divided the cluster of veins on the cord with a pair of scissors: a little bleeding took place, but none of any consequence; pressure for a few minutes stopped it, the wound healed, no inconvenience followed the operation, and the patient was entirely relieved of the pain which he suffered previously. In a case of varicocele of so much severity as to require any operation of this kind, I should be disposed to recommend the application of potassa fusa to the plexus of veins, having first exposed them by dividing the skin.

The cord and testicle are liable to be the seat of neuralgia. When a renal calculus is descending the ureter, the same parts are sympathetically tender and swollen.

CHAPTER XV.

THE BREAST.

The diseases of the breast fall under the following heads—acute inflammation and abscess, chronic inflammation, neuralgia, hypertrophy, atrophy, tuberculous disease, malignant tumours, encysted tumours.

I. *Acute inflammation* of the breast rarely occurs except during lactation: the swelling and shooting pain, with tenderness on pressure, are sufficiently declaratory of the nature of the disease. By a timely application of leeches, joined with repeated fomentation, and cooling medicine, the formation of matter may be often prevented. When suppuration has taken place, and distinct fluctuation can be felt, the abscess should be opened. When such an abscess is in progress of granulating and contracting, the matter secreted sometimes has the appearance of being mixed with milk.

II. *Chronic inflammation* of the breast is liable to occur at any period of life, from puberty till the complete degeneration of the gland: it generally attacks one or more lobules only; but sometimes the whole of the breast, and sometimes both mammæ are simultaneously affected. The inflamed part is firmer than the rest, and tender on pressure, and is the seat of constant uneasy sensation, often shooting and lancinating. The sensation communicated by touching the inflamed part is very characteristic; it feels a firm inelastic substance, with numerous nodules of the size of millet seeds in it. This complaint rarely goes to suppuration: but it is extremely troublesome, often continuing for years, better and worse; the pain generally aggravated before and about the catamenial period. I never saw this affection lead to malignant disease. I believe, however, that it has often been mistaken for it.

sionally only shooting pains in it: the tumefaction at the suprascapular region almost gone.

Some months afterwards, when I saw this patient, she continued in the same state, thinking herself, as I suppose she really was, cured.

III. *Neuralgia.* The breast extremely painful, tender on pressure, occasionally swollen—unattended with inflammation or alteration of structure. This complaint is frequent in young women, and is singularly unmanageable. Local applications in general do harm; but I have known a belladonna plaister, and ice, and a blister, temporarily remove the pain. Tonics in general, especially steel, are of most use in irritable breast.

IV. *Hypertrophy* of the glandular structure of the breast is supposed to take place occasionally. What is commonly considered to be this complaint, is an hypertrophy of the interstitial mammary fat.

Adipose tumour. A woman was admitted into Guy's Hospital for a tumour of the breast, which was of great size, and felt as if it were composed of an increase of the different lobes, of which the glandular structure of the breast consists. But upon making an incision for its removal, it was found that the different lobes of fat only which enter into the composition of the breast had become enlarged, and that the glandular structure itself was free from disease. The different branches of which the swelling was composed, were easily drawn out from between the different portions of the gland, so as to leave cells in which the lobulated fat had been contained.—*Cooper.*

V. *Atrophy.* The mamma naturally wastes sooner or later after menstruation has ceased. The adipose tissue about the gland is absorbed: the glandular structure diminishes in volume, and becomes firmer and greyer, losing its opaque milky colour, and becoming of a dirty white. The tubular structure, however, is not obliterated; a viscid serum can often be pressed from the atrophied gland. Sometimes the gland wastes early in life, particularly after children have been borne, and not nursed. Otherwise the mammary struc-

partly hoping that before. I mus
vealed Mr. Kiernan's inquiries,
partly because the organ under c
speedily and remarkably their se
degree acquainted with Mr. Kie
must now limit myself to the
character of these disorders, and
upon anatomical inspection.
which I follow, the reader will
name given in the Medical and P
ary, 1833.

The malignant diseases of the
ciliary secretion, gelatiniform sar

1. Carcinoma. This disease, w
tables of malignant diseases of t
after death, presents three dis
which are often met with combi
though sometimes, but rarely, th

a. A tumour, the whole of whi
lage in structure, dense, of a grey
slight approach to transparency,
same sound as cartilage. [V. 1.]

b. A tumour, cutting crisply, lik
pears, of a grey colour, succulent,
lines, containing an inspissated
lactiflua. [V. 2.]

c. A softer texture, more vascul
sels and succulent, not without

There is evidently a close alliance between these appearances. The first I met with constituting the mass of a tumour of the size of a small orange flattened, involving the whole breast, which I removed from an elderly woman in the cancer ward of the Middlesex Hospital; at one part only the softer character to a very small extent was found in it. A beautiful model of a section of this tumour is in the King's College Museum. The second is the common appearance found in carcinomatous tumours that are early removed. The third, mingled with the second, is the ordinary appearance where carcinoma of the breast has grown rapidly, or the operation has been long delayed. The first is rarely found constituting any large portion of a carcinomatous tumour of the breast; the second and third are common appearances, the third marking, I think, an advanced stage of the disease.

If the whole gland is not implicated, the excepted part is sometimes healthy, sometimes it is yellowish, hard, coarsely granulated, firm, and not unlike the pancreas in appearance. The enlarged lymphatic glands in the neighbourhood present two characters; they are either uniformly firm and of a greyish white, or softer, more succulent, grey and bloodshot, like the third form of carcinoma of the breast above specified.

To exemplify combinations of the above appearances, I shall quote some post mortem inspections from the paper of my own already referred to.

A woman, about forty-five years of age, had been afflicted several months with scirrhus of the mammary glands and of the integuments. The right breast was nearly flat, the nipple retracted; the integument immediately covering the gland, as well as the adjacent integument upon the right side and front of the body, was thickly studded with hard nodules. These nodules were a little elevated; most of them were about a third of an inch in diameter, one or two an inch, one an inch and a half; the largest among them were covered with a crust or thick scab. There were several lymphatic glands in the axilla enlarged and indurated; the right arm was œdematous and greatly swollen.

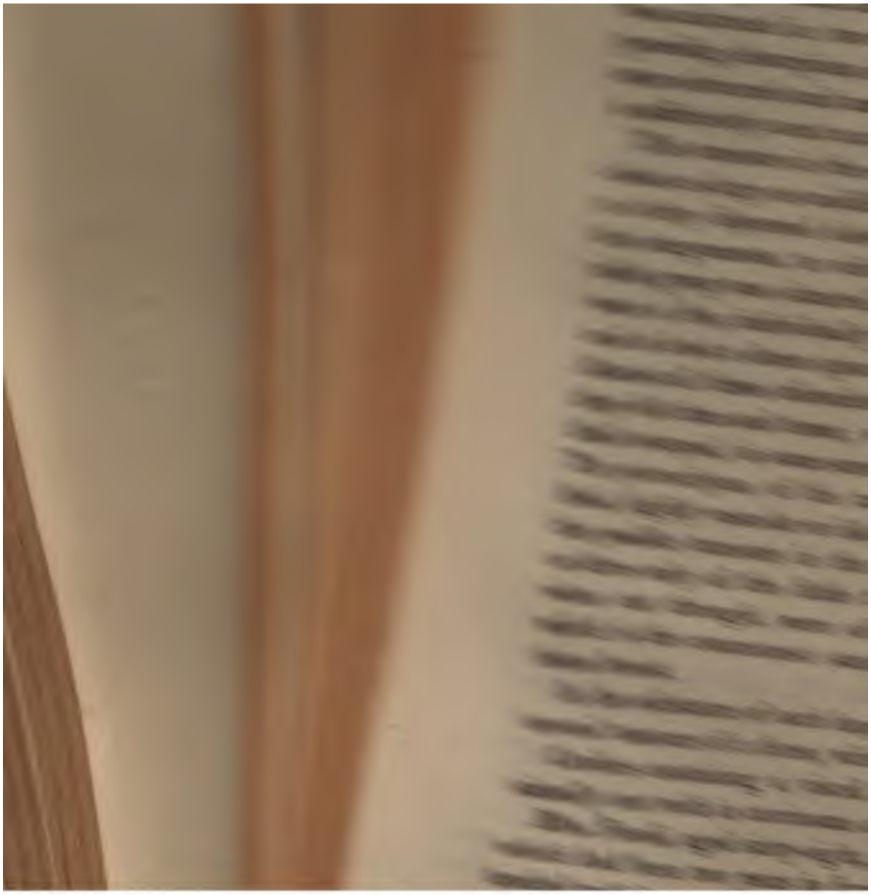
of the existence of which she had been aware about seven months. It was tender when pressed: it was not hard, but felt like a common inflammatory thickening of a lobe of the breast. In July, 1829, Sir Astley Cooper saw this patient with Mr. North, and prescribed a mercurial alterative at night with a bitter and aperient draught in the morning; the part to be bathed with a spirit lotion. This plan was pursued for a few weeks, during which the complaint continued stationary.

The following August I saw this patient with Mr. North: the part had become painful, and had increased in size, and there was fulness of the glands of the axilla. It was agreed that leeches should be occasionally applied, and the mercurial alterative used again. The symptoms improved under this treatment, and the breast ceased to be painful.

The lady now left town: on her return, about the beginning of October, the symptoms had changed for the worse. The swelling of the breast, although not much larger than before, had now the character of scirrhus; at the same time, subcutaneous tumours had formed in different parts of the body. Her breathing became affected; she was unable to lie down in bed. She sank rapidly, and died on the 1st of November.

Inspection.—The lump upon the inner edge of the left breast was prominent, so as to raise the integuments: it had to the touch the peculiar hardness of a scirrhus. Two other parts of the breast felt indurated, but not in the same degree. On making a section of the gland, the lump at the inner edge presented the following appearance: it was nearly spherical; its substance was particularly hard and dense, slightly elastic and crisp, mottled grey and white, the white predominating: the margin was here and there of a softer texture, and, for the depth of a third of an inch, vascular, or bloodshot. The morbid structure ended abruptly.

The other two indurated parts had a different character: the induration began insensibly, so that it was difficult to determine exactly where the natural structure of the breast ended. The central part of each was dense, slightly elastic,



On examining it, the structure was found to be the ordinary crisp grey scirrhus, with a cavity containing about two ounces of liquid, partly serous, partly viscid, of a dirty yellow colour. Mrs. Fuseli died two years afterwards of apoplexy. The disease had begun to reappear.

Scirrhus of the breast commonly exists as an indolent tumour, either on the surface of the gland, or deeply-seated, for from six months to two years before it causes much uneasiness; the lump is not at first tender on pressure, although occasionally the seat of lancinating pains. At length the tumour begins to enlarge, and, at the same time, it becomes sensible to pressure, and darting pains are felt in it, the pain often extending to the subclavian region, and down the arm. In its progress the complaint in different cases assumes different features, of which the following are the principal which I have remarked.

a. The skin not participating in the disease, becomes inflamed, and ulcerates over the most prominent and tender part or parts of the tumour: two or three such ulcers forming in succession, at first circular, red round the edges, but soft, the substance of the tumour is exposed, covered with firm granulations, which are of a pale red, and but partially organized, so that thin lines or patches of yellow lymph-like substance intervene among them. The ulcers of the skin enlarging, run into one. The carcinomatous tumour ulcerates, and the cavity so formed extends to a great depth, with most severe pain and suffering. The skin at length at a few points becomes tuberculous, and around the ulcer is brawny, hard, and red. The edge of the ulcer is irregular, but without either much eversion or inversion.

b. It sometimes happens in the preceding form of the complaint, that sloughing supervenes, which destroys with rapidity great part of the diseased structure. A lady, whom I attended, after very extensive mortification of a scirrhous breast, temporarily recovered: the surface cleaned and cicatrized, drawing the skin together towards a hard irregular cicatrix, which had the firmness, and, I have no doubt, the structure of carcinoma. After a few months ulceration began again, and the disease ran its usual fatal course.

affected breast had attained a great magnitude: the skin was firm, and not merely distended, but uniformly thickened, the natural pores and irregularities of its surface being rendered more distinct: the integuments of the side underneath the arm were in the same condition. There was slight redness upon the under part of the breast and upon the side. The termination of the case I did not see; but Dr. Langmore tells me, that, eventually, superficial ulceration took place, attended with the peculiar smell of carcinoma. The ulcer never became deep, or sloughed; the enlargement gradually lessened; the breast became hard, and immovably fixed to the ribs.

The enlargement of the subclavian and axillary glands, especially of the latter, contributes to aggravate the features of cancer. With the local swelling, there is an extension of pain, aching, or lancinating; and the arm becomes œdematous.

One case of carcinoma, which was recently under my care, I may take this opportunity of mentioning; the mamma was free from disease, which was confined to the subclavian glands, that formed a large, hard, rounded mass.

The important question now presents itself, whether carcinoma is a disease only to be palliated, or whether it admits of extirpation.

After amputations of a scirrhous breast under the most favourable circumstances, — that is to say, when the operation is performed at the earliest period at which the structural character of the disease has declared itself in the gland, no other part being yet invaded by it, and the diseased structure being entirely removed, — I believe, that, in ninety-nine cases out of a hundred, the disease returns either in the cicatrix, or in the axillary or subclavian glands. The operation therefore cannot be performed with any reasonable prospect of saving the patient eventually from the disease.

But the period of the return of scirrhus varies from six months to two or three years, or even longer. The interval may be one of health and hope; and even when the disease reappears, it does not in general return in a character of such formidable suffering as in its ordinary course it presents. The worst suffering in cancer arises from the destructive uldough. The surface between the breasts was hard and prominent; the skin thickened and nodular. At this part there were two ulcerated holes, an inch in diameter: the surface of the ulcers was dark. This patient had not experienced much pain: that which she had felt had been rather smarting than pain, and had been confined to the right breast and to the ulcerated part. She died soon after her admission.

The left breast (the smaller) was of a hard, white, firm, and fibrous, but doughy substance; here and there a calcareous concretion was found in it: in parts the texture was softer, more like the substance of brain, and slightly bloodshot in parts.

The right breast was generally softer, and great part of it consisted of brainlike substance, here and there streaked with blood.

The substance between the breasts and the lymphatic glands appeared upon a section white and firm; a thick white pulp or viscid fluid exsuded from it on pressure.

The right pectoral muscle was pale and wasted. The interstices between the fasciculi were studded with numerous small tubercles, which, when squeezed, yielded a white pulpy substance. This white, doughy, or pulpy formation was found both in the pleura costalis and the pleura pulmonalis, on the right side. There was a large quantity of water in the cavity of the right pleura.

In a lady, whom I saw in consultation with Dr. Langmore of Finsbury Square, about three months before her death by medullary sarcoma of the breast, the appearances bore some resemblance to those last described.

The neck was full: the skin soft and healthy, except at one part. Over the middle and lower part of the sternum there was a swelling, which extended to the inner part of the left breast: the lower and inner part of the left breast had a slight blush upon it. On the upper part of the neck two or three large blue veins were prominent. At the left part of the sternal swelling, over the insertion of the cartilage of the fourth rib, was a round, ulcerated opening, something larger than a sixpence, with soft red drawn-in internal to the nipple, the other at the upper and outer part. This lady is of a pale complexion and relaxed habit, liable to occasional attacks of erysipelas of the face, and continually required aperient medicine to move the bowels.

℞. A drachm of liquor potassæ to be taken three times a day in table-beer. A drachm of the ointment of hydriodate of potass to be rubbed upon the tumour night and morning.

The adoption of this plan was of temporary service. At the expiration of two months, the general health had considerably improved: the bowels no longer needed medicine: the shooting pains in the breast had entirely gone away. The tumour had not enlarged, and had become less tender on pressure.

The lady now went into the country, with directions to continue taking the liquor potassæ, in a dose increased to a drachm and a half three times a day.

Towards the winter this lady returned to London, having steadily pursued the plan laid down in all but the constant use of the ointment, which at one time irritated the skin. About the middle of December, 1828, the changes that had taken place were the following: — The breast had enlarged considerably; the shooting pains had recurred; and there was some tenderness in the axilla, but no enlarged gland could be felt there. I directed the application of leeches to the axilla, and frequent fomentation, upon which the tenderness in the axilla went away.

It appeared to me, however, that no time was to be lost in removing the tumour. Sir Astley Cooper, who saw the patient in consultation, concurred in the same opinion. I amputated the breast early in January 1829.

Upon examining the part after its removal, the disease, it appeared, had not involved the whole breast, part (or the whole) of which lay as a flat white cake, compressed and condensed to the right of the tumour towards the axilla. The nipple adhered partly to the unchanged breast, partly to the tumour. The tumour was about three inches in thickness, five in length, four in breadth. It was weighty, and tense. On cutting it through, the texture generally had a crispness like unripe fruit: the surface of the section was of

a light grey colour, glistening, and semitransparent;
interior texture succulent, in the softest parts tearing, w
a little force was used, into gelatinous strings: at the
cumference, the texture became more dense, and approac
more nearly, in colour and consistence, the character
scirrhus. There was no cavity in any part of the tumo
[y. 35.]

On the fourth day after the operation, the patient co
plained of pain at the lower and inner angle of the wou
The wound was dressed: adhesion seemed to have tak
place along the greater part, and there was no inflamm
tory tumefaction, or unusual tenderness, where the unea
ness was felt; yet, when she drew in her breath, there
some pain at this point which suddenly checked the ins
ration. This symptom had come on during the preced
night. The pulse was ninety; the skin something heat
but rather moist than otherwise; the tongue neither fur
nor dry. I thought it right, under these circumstances,
take away some blood: when she had lost fourteen oun
she became faint, and said that the pain had nearly left h
The blood showed that it would have a size. In less th
an hour the pain recurred more severely than before. S
was again bled to sixteen ounces, when she became fa
again, and the pain was scarcely felt. She then fell int
doze, and, on awaking, declared herself entirely relie
from the pain and oppression of breathing.

Every thing now went on favourably, and the wound h
healed in a fortnight after the operation. There has be
no return of the disease. The lady is now in good health

VIII. *Encysted tumours of the breast* present the followi
varieties:—Sometimes the tumour is a portion of a galac
phorous duct which has become obstructed, and, milk acc
mulating in it, has dilated it into a globular sac. Som
times the cyst contains serum only, or a transparent visc
liquid; and, instead of one, there may be several. Th
kind probably arises in the same manner as the first. Cy
again containing transparent liquid are often met with
carcinomatous tumours of the breast: while, on the oth
hand, cysts that were simple originally, after great and co

tinued distension, occasionally give origin to medullary tumours that grow from their internal surface.

1. Mrs. R., aged thirty, had a swelling of the right breast, which had existed twelve months, and appeared one month after the birth of her last child. The skin was undiscoloured, and her general health good. The swelling was of the size of an orange, and attended with occasional trifling pain. It was punctured, when a saucerful of milk, like curd or clouted cream, was discharged. The discharge continued for three days, and then ceased. — *Sir Astley Cooper.*

2. A young woman was admitted into Guy's Hospital for a tumour on the breast, which had existed several months. As there was an obscure fluctuation in it, a lancet was introduced, when a discharge of serum took place from the opening. A small piece of lint was introduced into the orifice, which brought on an adhesive inflammation: the sides of the cyst adhered, and the patient did well, having no return of the complaint.—*Sir Astley Cooper.*

A young lady had a tumour in her right breast. In its centre there was a distinct fluctuation surrounded by some hardness. A lancet was introduced, when a quantity of clear serum gushed from the opening. Adhesive plaister was applied, and the wound healed. The hardness remained for a length of time, and pain and swelling of the other breast supervened; but by taking alterative medicine, by bathing in the sea, by the application of soothing plaisters upon the part, the swelling disappeared, the uneasiness ceased, and she is now perfectly recovered.—*Sir Astley Cooper.*

Mrs. H., aged forty-five, had a tumour in her breast after lying-in. It was opened by means of a seton, and discharged a mucilaginous fluid. In the year 1800 the whole breast had become involved in the disease. There were several tumours in it: some felt like peas, others were as large as a marble; some had ulcerated and discharged a mucilaginous fluid, and then healed. There was occasionally slight pain. The breast was removed on the 5th of May, 1800; and, when examined, was found full of cells which contained a serous glairy fluid. One cyst was larger than the rest, and the membrane which formed it was highly vascular. In 1804 she had experienced no return of the disease, but was quite healthy. At the time of the operation there was in each axilla an enlarged gland, which disappeared after it, and never returned.—*Sir Astley Cooper.*

The following case is one of the most interesting, and at the same time of the most satisfactory in its results that I have witnessed, among diseases of the breast partaking of a malignant character: it combined an encysted tumour with medullary sarcoma: the latter grew in the interior of the cyst, and was probably an accidental consequence of the long-continued distension and irritation it had undergone.

Mrs. ——, aged sixty-one, consulted Dr. Chalmers, of Croydon, for an immense enlargement of the right breast, in March 1832. Twelve years before, she had first observed some uneasiness and fulness of the neck. The pain had never been very acute, and had never much disturbed her, and her health was good; but the swelling had gradually become so large, that the breast formed an immense bag, stretching from the clavicle to below the edge of the ribs from the side to the sternum; and measuring in length fourteen inches, and weighing, it was conjectured, about twenty pounds. She supported it habitually on the right fore arm. The parietes of the sac seemed attenuated in several places, where superficial abscesses had at different times existed and healed. Fluctuation was distinctly perceptible in every part of the tumour, and several irregularities of substance could be felt within it. The integuments were apparently œdematous, having a doughy inelastic feel. The patient's health was impaired: there was fever and irritability of the stomach, which Dr. Chalmers was endeavouring to allay before any thing further should be attempted; when, on the night of the 12th, the skin gave way at three points, and about a gallon of thick brown fluid was discharged: in the course of a few hours about another gallon was discharged. Between the 12th and the 21st from six to seven gallons more came away, so rapidly was this fluid reproduced. On the 21st I saw this patient in consultation with Dr. Chalmers; and, concurring with him in opinion that the tumour should be removed, was present during the operation, which he performed with great dexterity and boldness. A large portion of skin was removed, and the immense and thickened cyst was dissected from the front of the chest. The part removed weighed four pounds and a half. The cyst was about a quarter of an inch in thickness: from two or three parts of its internal aspect masses of fungus hæmatodes projected into the cavity. The patient recovered without any untoward symptoms, and is now alive and well, Feb. 1836. Some obscure threatenings of a return of the complaint have been recently observed by Dr. Chalmers, who thus speaks of them in a letter to me.

"I saw Mrs. —— this afternoon. She had enjoyed an almost uninterrupted good state of health ever since the operation in March 1832. She has quite recovered the use of the arm, notwithstanding the destruction of the tendon and the removal of nearly the whole of the pectoralis major. She can cross her breast with the arm; but, in raising her hand to touch the left shoulder or ear, she needs the elbow to be raised by the left hand. For two or three months past she has experienced an unpleasant tingling sensation stretching down the inside of the arm, commencing at the insertion of the heads of the tendon of the pectoralis; and though the cicatrix is quite healthy, and slides over the ribs without uneasiness, and there is not the slightest vestige of irregularity or tumefaction, yet I discovered in the margin of the axilla (apparently the extracted termination of the tendon) a hard tumour of irregular shape, not very moveable, but without pain even when handled roughly. Time will show what the nature or termination of this may prove: it has been there, she says, ever since the operation; and perhaps, after all, it may only be a bundle of consolidated fibres of the muscle." [*y*. 40.]

CHAPTER XV.

THE UTERINE SYSTEM.

The affections which will be enumerated under this head are disorders of the urethra and vagina; of the unimpregnated uterus; of the ovaries; extra-uterine foetation.

SECTION I.

Urethra and Vagina.

a. The female urethra is very rarely the seat of stricture: when that complaint has occurred, it has been situated immediately within the external meatus. Sir Benjamin Brodie describes an instance, in which he had an opportunity of examining a stricture which was quite at the extremity of the urethra, and occupied about half an inch of the canal.

A vascular excrescence is liable to grow from the female urethra: it is of a bright scarlet colour, and possessed of great sensibility: it varies in size from that of a large pin's head to the size of a horse-bean. It requires to be cut off, and the surface cauterized.

b. The external parts of the vagina are liable to hypertrophy or indurated enlargement [such tumours often require to be removed with the knife], to inflammation, abscess, ulcers.

In infants, the nymphæ are sometimes found adherent; a little pressure separates them.

Congenital imperforation of the vagina is liable to occur at the orifice [imperforate hymen], when it should be perforated with a trochar; or in the middle of the vagina, obliterating its cavity for the length of half an inch or more, when it should be carefully divided with a scalpel, lancet-shaped, and bent upon the flat.

Obstruction of the vagina is liable to occur from inflammation.

A woman who had borne several children had a premature confinement at the seventh month. Severe inflammation followed; and the vagina, which had perhaps partially sloughed, was narrowed. To remedy the constriction, a surgeon divided the part with a knife having several blades. Fresh inflammation was set up by this operation, and the canal became entirely obliterated through the adhesion of its sides. Three or four years afterwards this patient consulted me: she was at that time suffering periodically with epileptic fits, from suppressed menstruation. They were mitigated by bleeding. The uterus, when examined by the rectum, was found of the natural size. In this case I restored the vagina by dividing the substance which intervened between the bladder and rectum. I did not, however, succeed in reaching the uterine cavity, as I had hoped. I suspect that it was obliterated; for I certainly divided the cervix uteri obliquely, as I judged from the gristly texture of the part, and the sickness which the patient experienced. She lived many years afterwards; and her vicarious epileptic seizures were less frequent and severe after the operation.

Laceration of the vagina through the sphincter into the rectum, during labour, I have successfully treated,—following a suggestion of Mr. Copeland's,—by dividing the sphincter laterally on both sides, and preventing the new wounds closing by the introduction of a few threads of lint. The laceration was then encouraged to close by constant cleansing, and keeping the sides in apposition by bandaging the knees together. After the laceration had healed, the lateral incisions were allowed to unite. The part was perfectly restored, and the patient has borne two children since without renewed laceration or inconvenience of any kind.

SECTION II.

The Uterus.

The affections of the unimpregnated uterus are, disordered secretion; tumours in its substance; polypus; chronic inflammation, and enlargement and ulceration of the cervix; malignant disease.

I. Disorders of secretion are, suppressed or incomplete menstruation, menorrhagia, leucorrhœa.

II. *Tumours in the substance of the womb.* Tumours are formed between the fibres of the womb, which present accidental diversities of structure, but belong to one genus. Their form is spheroidal; their diameter from half an inch to six or eight inches; their ordinary structure well expressed by the term fibro-cartilaginous; firm, crisp, opaque, grey, or yellowish white, tearing into strong fibres or laminæ, often disposed concentrically; sometimes more granular; sometimes with cavities containing a brown or reddish gelatinous fluid. These tumours often contain and sometimes are incrusted with calcareous matter, which Dr. Bostock has shown to consist principally of phosphate of lime, with small quantities of the carbonate and sulphate. The calcareous matter is generally soft and porous, like pumice-stone; but instances have occurred in which it has admitted of being polished like ivory or marble. These tumours, when in the substance of the uterus, are easily unshelled, and turn out without much adhesion to its fibrous structure: but they are organized, and when they project on the peritoneal aspect of the womb, their surfaces are furrowed by the large veins belonging to them. The uterus often contains more than one such tumour.

These tumours are not malignant: they have no disposition to ulcerate, nor lead to similar disease in other organs.

When of a small size, they produce no inconvenience; when larger, they are liable mechanically to interfere with labour, to form weighty and troublesome abdominal tumours, to protrude towards the vagina as a form of polypus.

In a paper on this subject in the nineteenth volume of the Medico-Chirurgical Transactions, Dr. Robert Lee observes, that when fibrous tumours are imbedded in the proper tissue of the uterus, women are frequently barren; or, if they become pregnant, abortion takes place in consequence of the uterus being incapable of the necessary development in the latter months of pregnancy. When the ovum is not prematurely expelled, death may take place in such cases from uterine hemorrhage soon after delivery. M. Chaussier saw a woman die from flooding soon after giving birth to a full-grown child, when there was a large fibrous tumour on the posterior walls of the uterus. This tumour was not so situated as to present an obstacle to the passage of the child through the pelvis; but soon after delivery, it was perceived that the uterus had not the power of contraction. Profuse hemorrhage took place from that part of the uterus in which the tumour was lodged: the flow of blood could not be arrested, and the patient died.

Sometimes these tumours are expelled by the contraction of the uterus after labour.

Fibro-cartilaginous tumours formed at the fundus of the uterus, beneath the peritoneum, rise into the abdomen, and may be felt moveable in that cavity. One of these, weighing about eight pounds, Dr. Granville showed to me, which he had removed: it was attached by a short peduncle an inch in diameter, and had contracted no adhesions. The case was therefore, if any such case can be, favourable for the operator: the patient, however, died,—I think within forty-eight hours.

III. *Polypus.* One sort of polypus of the womb arises from the accidental growth of a fibro-cartilaginous tumour immediately behind or near the mucous lining of the uterus, whereby, as it grows, it projects first into the cavity of the uterus, then into the vagina, then externally.

Another resembles, except that it is firmer, polypus of the nose: this kind has a light yellow tint with a shade of green.

Another tumour forms under the lining membrane of the uterus, the structure of which is different from that of either of the preceding. It consists of a congeries of small vesicles or cysts, filled with a clear or yellowish-coloured ropy fluid, which cysts are imbedded in a soft fibrous substance situated under the lining membrane of the uterus.

A fourth variety of polypi consists of obstructed and enlarged muciparous follicles. These are liable to form cysts which sometimes attain the size of an egg, and are attached to the cervix.

The three first kinds of polypi should be tied at their peduncle, not too close to the uterus. Mr. Beaumont, o Manchester Street, has invented an excellent instrument for this purpose. The last probably require only to be punctured.

Polypus of the uterus becomes dangerous through the serious and repeated hemorrhages which it gives rise to.

The cervix uteri is liable to chronic inflammation, through which it becomes swollen and elongated. It is likewise liable to ulcerate: the ulceration spreading, destroys the cervix uteri, and extends into both the bladder and rectum.

IV. *Malignant disease.* The os uteri is liable to scirrhus or the texture of the cervix or entire womb may become o cartilaginous hardness; after which ulceration commence at the cervix, leading to the same extent of destruction a the preceding case.

Medullary sarcoma of the uterus is more frequent than scirrhus: it generally commences at the cervix uteri, a sof fungus growing from which is often for a time the whole extent of the disease. Afterwards the vagina and bladde become involved.

SECTION III.

The Ovaries.

The ovaries are liable to enlarge into ample cysts, containing a thick, viscid, brown fluid, which commonly occupies, not a simple cavity, but a series of loculi separated by soft membrane.

The ovaries are occasionally the seat of fibro-cartilaginous tumours, and of medullary sarcoma.

This subject has occupied the attention of Dr. Seymour, who has illustrated it by a series of beautiful engravings.

SECTION IV.

Extra-uterine Fœtation.

The embryo, when it does not reach the uterus, may be developed either in the Fallopian tube, or in the ovary, or in the peritoneal cavity. In the first instance, the distended Fallopian tube ulcerates, and fatal hemorrhage takes place about the sixth week. In the two latter, the fœtus usually attains complete development; but, at the expiration of nine months, it dies. An effort is then made to throw out the dead fœtus. This is sometimes attended with a favourable result; the bones either passing by the bowels, or through an abscess pointing through the walls of the abdomen. The process, however, is extremely slow, occupying many months; and, in the majority of instances, the patient sinks under it. It is probable that the removal of the fœtus might always be practised with safety, the time being properly chosen, in those cases in which the conception lies before the bowels.

In the following case, a dead fœtus was removed with complete success. The statement, as it is here printed, is taken from the Medical Gazette for November 7, 1835; to which it was sent by Mr. Hutchinson, of Farringdon Street, Blackfriars' Bridge, who had the good fortune to bring to a successful termination this important case.

"Mrs. J——, ætat. twenty-eight, living at 5, Butcherhall Lane, of an active disposition and healthy constitution, has been married eleven years without having borne a child, and was always perfectly regular in regard to the catamenia until August 4, 1834, when that discharge appeared for the last time. In consequence of its suspension, she considered herself pregnant; and was confirmed in that opinion as well by the declaration of the medical gentleman to whom she applied for advice, as by her own feelings. His statement was, 'that she had every symptom attendant on such occasions.' From the beginning of September she states, that the breasts enlarged considerably, and that a milky fluid was secreted in such quantity as to be readily squeezed out on the application of pressure: the areolæ around the nipples also were deeply shaded. Her person enlarged more rapidly than is usual in early pregnancy; so that by the middle of September she had acquired a considerable bulk. It was remarked, that the abdomen was more prominent on the left side than on the right. She now became the subject of occasional spasmodic pains in the back and the region of the stomach; and so violent were these attacks as to produce syncope, and deprive her of all consciousness while they lasted. During the month of October, she believed that she felt the movements of a child distinctly. Her increase in size was regularly progressive; but so quick, that she was represented to have been as large by the end of January as the generality of women are at the full period of gestation. After the month of December had passed, she felt the movements of the child continually, and it seemed to become daily stronger: the enlargement continued to be greatest on the left of the linea alba. At the end of April she was seized with periodical uterine pains, attended with much expulsive effort. She then considered herself in labour, especially since (according to her own calculation) the ninth month of her pregnancy had expired. The pains continued for nearly three weeks, accompanied with a discharge from the vagina of clear fluid, sometimes mixed with blood, and at other times assuming a yellowish appearance, amounting altogether, she believes, to about two quarts; and after the passage of two or three stringy substances, they gradually subsided. She suffered at intervals, during this period, great agony from the restlessness of the child; after which it ceased to move, and she has not felt it since. Still, however, her abdomen continued to enlarge, and her legs became œdematous. From the latter part of May, she gradually wasted; her breasts and lower extremities shrank to less than half their former dimensions; her appetite failed; and general debility ensued. The size of the abdomen, however, remained nearly stationary.

"The preceding statement constitutes the history and symptoms of the case until the 14th June, 1835, when Mrs. J. first called at my house. The symptoms then present were as follows: — She was much emaciated, but her general aspect was not unhealthy. Pulse 100; tongue clean; bowels indolent, unless their action was excited by purgatives. Her sleep was sound, and appetite good; but she felt afraid of taking solid food, in consequence of its producing pain in the stomach accompanied with flatulence. She complained of pain in the lower part of the back when in the erect position, and a dreadful sense of suffocation when recumbent.

"On an examination per vaginam, that canal was found to be shorter than natural, and its sides were compressed by the protrusion of a large tumour, occupying a portion of the pelvis between it and the rectum. The os uteri was indistinctly felt, conveying to the touch an impression that the fundus was turned downwards and backwards, and the mouth forced up behind the pubes.

"I did not see the patient again till July 8th. I found her much altered for the worse, and considerably more reduced than when the former observations were made. The pulse was now 115; the respiration laborious; tongue dry and furred; there was a disagreeable taste in the mouth, and the bowels were constipated; there was also frequent vomiting of a white frothy fluid; pain in the back; constant desire to

pass urine, which was voided i
evacuation afforded only tempo
sense of distension. She suffere
ing down pains, with cramps i
were disturbed and sleepless.

"Dr. Ramsbotham visited he
symptoms being then as just
the tumour externally, and by th
that the case was one of ovarian
sis abdominis ought to be adopte

"Dr. F. H. Ramsbotham saw
father, on the 12th; and from th
tion communicated to the hand
considered that there was ascite
enlargement. He concurred in
the fluid, and thought that as l
be lost before the operation was

"On the 15th, in the presence
and Mr. Margetson, I introduced
the abdominal parietes, in the lin
above the umbilicus, where the
About six pints of a thick, siz
escaped, possessing an unpleasan
odour. This proceeding afforde
instantaneous relief to the suffoc
had previously experienced. On
Dr. F. H. Ramsbotham expresse
having been previously impressed
was contained in the peritoneal c
heal, and a fluid continued to be
first resembled that let out by
degrees more offensively fœtid,
operation, when a small lock of f
From this date pieces of the same
edly, as well as globules of oil, a
with some membrane, which was
resembling fœtal intestines, and
by the fingers to a considerabl
scribed substance could now be

abdominal parietes, in the left hypochondrium, evidently the head of a child, and no doubt remained in the mind of either Dr. F. H. Ramsbotham or myself as to the true nature of the case. She remained much in the same state throughout August; but before the middle of September all the symptoms became aggravated. She suffered much from constitutional irritation; the pulse rose to 120: there was great thirst, and her appetite was impaired, which she attributed to the offensive effluvia that arose from the putrid discharge.

"On September the 21st Dr. F. H. Ramsbotham again met me, and I proposed making an incision sufficiently large to remove the child. To this measure he objected, thinking putrefaction had gone on to such an extent that the body could not be extracted entire, and that the frequent introduction of the hand would be required for the purpose of emptying the cyst in which it lay; but he thought it would be desirable to enlarge the aperture to the extent of an inch or two, that the fluid might have a more ready exit, and that an opportunity might be afforded us of examining more accurately the degree of decomposition that had taken place.

"Accordingly, on the next day, in the presence of that gentleman and Mr. Margetson, by means of a director and bistoury, I made an incision about two inches in length downwards, below, and rather to the right of the umbilicus. A small artery was divided, the hemorrhage from which, however, was easily checked by gentle pressure; a considerable quantity of fœtid matter escaped. The finger could be introduced to its whole extent into the cyst, upwards, downwards, and laterally; and it was ascertained that the fœtal body still retained much greater firmness and solidity than had been anticipated. We were yet not perfectly agreed as to the propriety of extending the opening, and it was determined to seek the advice of a consulting surgeon. On the day after, therefore (Sept. 23d), we obtained the opinion of Mr. Mayo; and as he concurred with me, Dr. F. Ramsbotham withdrew his objection, and it was agreed that the body of the child should be removed without delay. Besides the gentlemen just named, Mr. Margetson was present, and his opinion was also favourable for the operation.

unrelieved.

"2dly. The original risk arisin
a peritoneal ovum was already go
tion of puncturing and admitting
be prejudicial; the operation had
jured this patient. A freer openi
isting source of irritation in the a
to add another.

"3dly. It was evident, from exa
the cyst enclosing the fœtus lay b
hind the abdominal parietes; and
might be enlarged upwards and d
of the linea alba, without risk of
vity, or dividing any part of the r
was not adherent to the outer me

"The operation was performed i

"I enlarged the aperture, both a
tent of about five inches. Mr. I
hand, and grasped the left upper e
out of the wound; but the transv
prevented its being extracted by t
therefore separated at the shoulde
taken hold of was a foot; this
the trunk afterwards extracted wi
however, was too bulky to come
suggestion of Dr. F. H. Rams
punctured with a scalpel in the la

with some membrane, was left hanging out of the wound. Upon gently pulling the maternal end of the funis, the placenta was felt to be still adherent: no attempt was therefore made to remove it. The wound was dressed with a strip or two of adhesive plaister, and poulticed, an opening being left at the lower part to allow the escape of the fluid still within the cyst.

"The operation did not occupy much more than five minutes, and was borne by the patient with the greatest fortitude. No vessel was divided that required to be secured; but a slight faintness came on soon after its completion. The fœtus was as large as an ordinary one at full time, and the cuticle was perfect except on the scalp, whence it had entirely separated, and over the vertebræ and the joints of the fingers and toes, which were denuded.

"Sept. 24th.—Met Mr. Mayo and Dr. F. H. Ramsbotham, the latter of whom has continued to attend with me three or four times a week from this period. She has passed a good night; expresses herself much relieved; the countenance is cheerful; pulse 115, but evidently excited by seeing us. There has been no rigor or sickness; no pain or tension on any part of the abdomen. The bladder has acted two or three times; one motion of a natural appearance has passed: a larger portion of membranes than was apparent yesterday is hanging out at the lower part of the wound: she complains of being hungry: the dressings were not disturbed. It was not thought necessary to administer any medicine; but she was allowed a little broth.

"25th.—Another comfortable night; we found her eating some flounders. Pulse 100, no pain, and the bowels and bladder had acted. The fluid discharge since yesterday has been trifling; but a considerable part of the placenta is offering itself at the aperture. The whole of this organ was drawn away most easily by a pair of forceps; it was perfectly putrid: the cellular web having been entirely destroyed, and the vessels separated from each other, hung down like strings. It had the appearance, indeed, of having been a long time macerated in water. It was smaller than a uterine placenta.

BY THE SAME AUTHOR.

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